Pregnancy Complications
Medical Management, Nursing Care, and Patient Teaching

LEARNING OUTCOME AND OBJECTIVES: Upon completion of this continuing education course, you will be able to identify the risk factors, signs and symptoms, medical management, nursing care, maternal and fetal implications, and relevant patient teaching related to the most common complications that affect women during pregnancy. Specific learning objectives to address potential knowledge gaps include:

- List the most common pregnancy complications.
- Describe the incidence and risk factors for the most prevalent pregnancy complications.
- Identify signs and symptoms in women affected by pregnancy complications.
- Discuss the medical management and nursing care typically provided in response to pregnancy complications.
- Describe maternal and fetal implications arising from the most prevalent pregnancy complications.
- Summarize relevant patient teaching offered to those women and families experiencing pregnancy complications.

INTRODUCTION

Pregnancy is one of the most profound times in a woman’s life. It is marked by a variety of physical changes, as well as by thoughts and feelings that sometimes overwhelm the mother-to-be. Though pregnancy is generally a time of joy and well-being, complications can occur that cloud the experience and put the woman and her unborn child at risk.
Pregnancy complications are occurring in an increasing number of pregnancies, with more than 50,000 women in the United States affected by the most severe complications. Approximately 700 women die annually in the United States from pregnancy-related complications. Leading causes of death vary by timing relative to the end of pregnancy, and approximately 3 in 5 pregnancy-related deaths are preventable.

The Centers for Disease Control and Prevention (CDC) report that severe maternal morbidity and mortality has been steadily increasing in recent years. Contributing to the increase may be changes in the “overall health of the population of women giving birth”—e.g., increases in maternal age, prepregnancy obesity, preexisting chronic medical conditions, and cesarean delivery (CDC, 2018).

Significant racial/ethnic disparities exist in pregnancy-related mortality. Research found that black women have a pregnancy-related mortality ratio approximately three times as high as that of white women, although preventability did not differ significantly by race/ethnicity or timing of death. Late postpartum deaths in black women were attributable to increased cardiomyopathy (Petersen et al., 2019).

Recognizing the major causes of death by timing can help identify opportunities for intervention.

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<thead>
<tr>
<th>CAUSES AND TIMING OF PREGNANCY-RELATED DEATHS</th>
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<tr>
<td>Timing</td>
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<tr>
<td>During pregnancy</td>
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<td>Days 7–42 postpartum</td>
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<td>Days 43–365 postpartum</td>
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Conditions prior to conception that can complicate a pregnancy include:

- Asthma
- Depression
- Diabetes
• Eating disorders
• Epilepsy and seizure disorders
• High blood pressure
• HIV
• Migraine
• Overweight and obesity
• Sexually transmitted diseases
• Thyroid conditions
• Uterine fibroids
  (Office on Women’s Health, 2019)

The most prevalent complications that arise during pregnancy include:

• Pregnancy loss
• Bleeding in early or late pregnancy
• Hyperemesis gravidarum
• Hypertensive disorders of pregnancy
• Gestational diabetes mellitus
• Preterm rupture of membranes
• Preterm labor and birth

Nurses working in perinatal settings are in a unique position to screen, monitor, and provide care to patients who are affected by complications during pregnancy. It is essential for nurses to be familiar with these complications, as well as the maternal and fetal implications, medical treatment and management, and nursing care necessary to address these problems.

BLEEDING COMPLICATIONS: EARLY PREGNANCY

Pregnancy Loss

Pregnancy loss (also referred to as spontaneous abortion or miscarriage) describes the loss of pregnancy at gestation less than 20 weeks or fetal size ≤500 grams (Tulandi & Al-Fozan, 2019). Abortion can be either spontaneous or induced. Spontaneous abortion occurs without intervention from the woman or another person.

TYPES

Pregnancy loss affects 10%–31% of pregnancies (Prager et al., 2019). Risk for pregnancy loss increases with increasing maternal age and prior pregnancy loss. Pregnancy loss can be caused by a number of other factors, including chromosomal abnormalities, maternal infection, maternal endocrine disorders (e.g., hypothyroidism, uncontrolled diabetes), reproductive system

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abnormalities (e.g., an incompetent cervix), and maternal injury. Literature suggests that drug use and environmental factors may also be linked to the occurrence of spontaneous abortion.

Spontaneous abortions have previously been classified according to symptoms and the outcome of the pregnancy tissue (also called products of conception). Spontaneous abortions have been described as threatened, inevitable, incomplete, complete, missed, or recurrent, though these terms are imprecise and are being phased out. The definitions are included here for reference purposes.

**Threatened abortions** are diagnosed when there is vaginal bleeding without a clear diagnosis of pregnancy loss. However, careful monitoring and appropriate intervention are necessary. The symptoms may resolve or there is progression to inevitable, complete, or incomplete abortion. Only 12% of women with first-trimester vaginal bleeding experience early pregnancy loss (Prager et al., 2019). Typically, female patients with threatened abortion are instructed to avoid vigorous activity, heavy lifting, and sexual intercourse but are not prescribed bedrest (Tulandi & Al-Fozan, 2019). Patients are also encouraged to note and report to their healthcare provider any bleeding, cramping, and passage of tissue from the vagina.

**Inevitable abortions** occur when amniotic membranes rupture and the cervix dilates. In this case, abortion or miscarriage is considered inevitable. This terminology is no longer preferred, as the cervix is difficult to assess in clinical practice and some patients may have a cervix that appears dilated and continue their pregnancy. Patients typically have cramping. Pregnancy tissue is commonly expelled without intervention. However, a dilation and curettage (D&C) (a surgical procedure in which the cervix is dilated and an instrument is used to scrape the uterine lining) may be performed if necessary.

**Incomplete abortions** occur when some, but not all, pregnancy tissue is expelled from the uterus. The retained tissue prevents the uterus from contracting completely, which results in bleeding from uterine blood vessels. Patients generally experience severe cramping and profuse bleeding and receive intravenous fluids and possibly blood products. A D&C or medication evacuation (using misoprostol or mifepristone followed by misoprostol) is performed to remove the retained tissue (Tulandi & Al-Fozan, 2019). Additionally, patients may receive medications such as methylergonovine (Methergine) to contract the uterus and stop the bleeding.

**Complete abortions** occur when all of the pregnancy tissue, including the fetus and placenta, are expelled from the uterus. The cervix closes and cramping and bleeding stop (although bleeding may continue normally for one to three weeks). Further intervention is typically not necessary. However, the patient is advised to notify her healthcare practitioner of any additional bleeding, pain, or symptoms of infection, such as fever or foul-smelling vaginal discharge.

**Missed abortions** occur when the fetus expires during the first half of pregnancy but is retained in the uterus. If there are no obvious signs of infection present, the patient may carry the fetus until spontaneous expulsion occurs. This may take several weeks. However, medical (i.e., misoprostol [Cytotec]) or surgical intervention may be advised.
Recurrent pregnancy loss refers to three or more consecutive pregnancy losses and occurs in 0.4%–1% of women. The most common etiologies include uterine factors (e.g., anatomical anomalies, cervical insufficiency), immunologic factors (e.g., antiphospholipid syndrome), endocrine factors (e.g., diabetes mellitus, thyroid disease, and polycystic ovary disease), genetic factors (fetal abnormalities of chromosome number or structure), thrombophilia and fibrinolytic factors, and environmental chemicals and stresses (Tulandi & Al-Fozan, 2018). Patients are screened and examined for reproductive system abnormalities, such as recurrent premature dilation of the cervix, also known as incompetent cervix or cervical insufficiency. In the case of the premature dilation of the cervix, a suturing procedure known as a cerclage may be performed to prevent the cervix from opening until delivery.

Reproductive system abnormalities may prevent the successful implantation and growth of the ovum. If the reproductive system is found to be normal, genetic screening is performed. Treatment of recurrent pregnancy loss is based on the causative factor.

GENETIC INFLUENCE OF THE FATHER

While advanced maternal age is a known contributor affecting fetal genetics and thus pregnancy loss, advanced paternal age (age >40 years) appears related to a modest increase as well (Tulandi & Al-Fazan, 2018). Studies have been small and show either no added risk or some additional risk. One prospective study by Slama and colleagues (2005) looked at 5,121 California women and determined that paternal age >35 years increased the risk of early pregnancy loss. Another study by Frattarelli and colleagues (2008) showed significant increase in pregnancy loss, decrease in live birth rate, and decrease in blastocyst formation rate in men >50 years of age, with 1,023 male partners participating in anonymous oocyte donation cycles.

NURSING CARE

Nursing care for patients experiencing a pregnancy loss varies depending on the type of loss. However, the primary nursing intervention for all types of pregnancy loss is to ensure patient safety by identifying and controlling bleeding and hemorrhagic shock. Symptoms of hemorrhagic shock include an increased heart rate, decreased blood pressure, cool and clammy skin, lightheadedness, and confusion. The nurse should anticipate the need for oxygen therapy and fluid and blood replacement. The nurse may also be responsible for administering medications; for example, misoprostol (Cytotec) may be used to help in expelling the pregnancy tissue or to control bleeding. Patients should be blood-typed and cross-matched in case blood transfusion is necessary.

The nurse monitors vital signs, oxygen saturation, intake and output, and laboratory results according to institutional policies. If a patient experiences a threatened abortion but the fetus does not die, the nurse may be responsible for monitoring fetal heart sounds and the overall well-being of the fetus depending on gestational age. The nurse should administer prescribed Rh\text{0} (D) Immune Globulin (human) (RhoGAM) to Rh-negative patients within 72 hours to prevent alloimmunization (an immune response to the fetus’s blood cells).
RhoGAM

RhoGAM should be given to Rh-negative patients at approximately 28 weeks’ gestation, within 72 hours of the birth of an Rh-positive baby, with the possibility of maternal fetal hemorrhage (such as trauma to the abdomen during pregnancy, after an ectopic pregnancy, bleeding during pregnancy, after a pregnancy loss or induced abortion, after attempt at cephalic version, and after invasive procedures [e.g., amniocentesis]).

The nurse caring for a patient experiencing pregnancy loss will also need to help the patient explore her feelings regarding an actual or potential loss. Many patients feel that their actions somehow led to the loss; therefore, feelings of guilt are often significant emotional challenges that many patients must face while grieving their loss. It is important to reassure the woman and her partner that there is no evidence that routine activities cause miscarriage (e.g., sexual intercourse, heavy lifting, bumping her abdomen, stress) (Tulandi & Al-Fozan, 2019).

Similarly, women who suffer from a threatened pregnancy loss and do not lose the fetus are often afraid that they may still lose the fetus and remain stressed throughout the remainder of the pregnancy. This affects not only the patient but also her family, and the nurse should do everything possible to assist the patient and her family during this time.

COMPLICATIONS OF MISSED ABORTIONS

Two serious complications of missed abortions are infection and disseminated intravascular coagulation (DIC).

Infection

Infection can occur as a result of carrying an expired fetus and is a serious health threat to these patients.

PATIENTS WITH MISSED ABORTION: INFECTION AND WHITE BLOOD CELL COUNT

White blood cell (WBC) counts, especially neutrophils, increase naturally during pregnancy. During active labor there may be another normal increase, even in the absence of infection. In nonpregnant patients a normal WBC count is somewhere between 5 and 10 (5,000–10,000 cells/mm³), but for patients who are pregnant, those normal values can be between 6 and 16 in the third trimester and may reach 20 to 30 during labor and the early postpartum period. When evaluating patients with missed abortion for infection, therefore, it is important to look for other clinical indicators—such as increased temperature, bacteriuria, WBCs in urine, uterine tenderness, and fetal tachycardia—and document them.
**DIC**

DIC (disseminated intravascular coagulation) occurs when there is an overactivation of the clotting process in the body. Specifically, the body produces excessive amounts of thrombin in attempts to control bleeding. This stimulates the conversion of fibrinogen to fibrin. As a result, clots form in blood vessels throughout the body and prevent blood flow to vital organs. Clotting factors are heavily consumed during this process and generalized hemorrhage occurs.

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<tr>
<th>LABORATORY VALUES FOR DISSEMINATED INTRAVASCULAR COAGULATION</th>
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<tr>
<td><strong>Normal</strong></td>
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<tr>
<td>Fibrinogen (factor I)</td>
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<tr>
<td>Platelets</td>
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<tr>
<td>Fibrin split products (FSP)*</td>
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<td>D-dimer**</td>
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* Also called fibrin degradation products (FDP) when clots are broken down
** Made when clots are broken down

Essentially, DIC produces clotting, bleeding, and ischemia that occur simultaneously. Symptoms include sudden shortness of breath, chest pain, and/or cyanosis. Bleeding from the nose, gums, and IV sites, as well as petechiae, also occur in the presence of DIC. Treatment is aimed at delivering the fetus and placenta, which will stop the overactivation of the clotting process. Patients are treated with oxygen therapy and are usually given blood products.

**PATIENT TEACHING**

Nurses are responsible for ensuring that patients are adequately prepared to care for themselves upon discharge from the hospital following treatment or monitoring for a pregnancy loss. It is important that patients understand the warning signs of further complications and the importance of reporting such signs to their healthcare practitioner.

Warning signs include fever, foul-smelling vaginal discharge, significant bright-red vaginal bleeding, and pelvic pain. In addition, patients are encouraged to maintain pelvic rest (nothing per vagina) for two weeks. Experiencing a pregnancy loss is challenging for women both physically and emotionally, and they need to rest for a few days after discharge. They may be prescribed iron supplements for blood loss and/or antibiotics to treat or prevent infection. Foods such as liver, green leafy vegetables, dried foods, and eggs provide needed iron. Additional fluid intake is recommended.

For women who have a threatened loss but continue to have a live fetus, education should be provided regarding avoiding vigorous activity, heavy lifting, and sexual intercourse (Tulandi & Al-Fozan, 2019). Nurses should educate their patients to note and report to their healthcare provider any bleeding, cramping, and passage of tissue from the vagina.
It is important that the nurse recognize and acknowledge the patient’s loss or threatened loss. The patient needs to understand that it is normal for her to go through a grieving process. The patient should also be provided with appropriate community referrals for counseling and/or support groups. She may be eager to become pregnant again if she loses the fetus; however, she should be encouraged to allow her body to rest and recover before attempting another pregnancy and to discuss with her healthcare practitioner when the appropriate time to conceive would be.

**CASE**

Rihanna is 29 years old and pregnant for the fifth time. Her first pregnancy resulted in birth at 34 weeks’ gestation and produced her only living child. She subsequently had three pregnancy losses at 12 weeks, 14 weeks, and 18 weeks. Rihanna is currently at 12 weeks’ gestation and is at the clinic for her first prenatal checkup. She was seen crying quietly in the waiting room and later states, “My mother-in-law says that if I weren’t such a weak person, I would not keep losing my babies.”

**Discussion**

Rihanna has had three consecutive pregnancy losses, which indicates that she has a history of recurrent pregnancy losses. Her healthcare practitioner discusses possible causative factors, such as cervical insufficiency or genetic disorders. It is important that Rihanna understand that her behavior did not cause the numerous losses. The nurse caring for Rihanna supports and offers encouragement to her throughout the pregnancy.

(Case study courtesy of Sharon Walker, RN, MSN.)

**Ectopic Pregnancy**

Ectopic pregnancies occur when the ovum is fertilized by the sperm but implants at a site other than the endometrium of the uterus. Ninety-six percent of ectopic pregnancies occur in the fallopian tubes (Tulandi, 2019a). Other possible implantation sites include the cervix, ovary, or abdominal cavity.
INCIDENCE AND RISK FACTORS

The overall incidence of ectopic pregnancy in the United States increased during the mid-twentieth century, plateauing at 19.7 per 1,000 pregnancies in the early 1990s, the last time national data were reported (CDC, 1995). Ectopic pregnancies are caused by a variety of factors, which include anything that would prevent or slow the fertilized ovum’s journey to the lining of the uterus. More specifically, anything that causes scarring in or blocks the fallopian tubes may cause an ectopic pregnancy.

Patients who are of advanced maternal age or have reproductive system anomalies, a history of tubal surgery, pelvic genital infections, in utero diethylstilbestrol (DES) exposure, intrauterine devices (IUDs), cigarette smoking, in vitro fertilization, or use fertility drugs are at higher risk for having an ectopic pregnancy. The literature also suggests that women who douche regularly have a higher risk of an ectopic pregnancy (Tulandi, 2018).

SIGNS AND SYMPTOMS

Signs and symptoms of an ectopic pregnancy include vaginal bleeding, lack of menstruation (amenorrhea), and abdominal pain. However, other disease processes (e.g., pregnancy loss) may
be responsible for such symptoms. Transvaginal ultrasound and human chorionic gonadotropin (hCG) laboratory testing are necessary to diagnose an ectopic pregnancy.

The outcome of an ectopic pregnancy depends on the location of implantation. The ovum may naturally reabsorb into the body, or the structure supporting the ovum may rupture. If the implantation site is a fallopian tube, the tube may rupture and cause internal hemorrhaging and hypovolemic shock, which is a life-threatening event for the patient.

Signs and symptoms of a ruptured fallopian tube include vaginal bleeding; severe abdominal pain or pelvic, shoulder, or neck pain (as a result of blood leaking out of the fallopian tube and irritating the diaphragm); weakness; dizziness; decreased blood pressure; and increased pulse. It is important to note that many patients experiencing an ectopic pregnancy are asymptomatic prior to tubal rupture.

MEDICAL MANAGEMENT

An ectopic pregnancy implanted in a fallopian tube requires either pharmacologic or surgical management. Pharmacologic management with methotrexate is indicated if the tube is unruptured, the ectopic pregnancy is less than 3.5 cm, there is no fetal cardiac activity, and the patient is stable hemodynamically. Methotrexate is an antimetabolite chemotherapeutic agent that stops cells from dividing and thus stops the gestation. Often, patients require more than one dose of methotrexate for effective treatment. Methotrexate treatment is usually performed on an outpatient basis. Renal and liver function tests should be confirmed before administering methotrexate due to possible toxicity issues.

If the fallopian tube is ruptured as a result of an ectopic pregnancy and the patient wants to become pregnant in the future, a surgical procedure called a salpingostomy is performed to protect the tube. A salpingostomy requires a small linear incision in the tube to remove the pregnancy tissue. The tube is then allowed to heal without suturing to prevent significant scarring. Significant scarring in the fallopian tube could potentially affect the ability of the patient to have a successful pregnancy in the future. If the tube is damaged or ruptured, bleeding is uncontrolled, or the gestation appears too large to remove with salpingostomy, a laparoscopic salpingectomy is performed (Tulandi, 2019c). This procedure involves the removal of the affected fallopian tube.

NURSING CARE

The nurse caring for a patient experiencing an ectopic pregnancy looks for changes in the patient’s blood pressure and pulse, which could indicate hypovolemic shock resulting from hemorrhage. Regular assessment of vaginal bleeding is also essential. Rh-negative patients require administration of prescribed RhoGAM to prevent alloimmunization. Finally, the nurse is responsible for monitoring and controlling pain levels.

If salpingostomy or salpingectomy is performed, the nurse monitors vital signs, oxygen saturation, intake and output, and laboratory results according to institutional policies. As with all patients experiencing a pregnancy loss, it is important for the nurse to recognize the loss and
to provide resources to assist the patient in coping with the emotions that accompany the experience of an ectopic pregnancy.

**PATIENT TEACHING**

Nurses are responsible for ensuring that the patient is aware of signs and symptoms that require a call to the healthcare practitioner or a return visit to the emergency room following hospital discharge. More specifically, if the patient experiences pain, significant bleeding, or a fever and chills, she must notify her healthcare practitioner. The nurse should provide the patient with a clear understanding of the normal feelings of anger, sadness, or guilt that may arise following an ectopic pregnancy and that these feelings are part of the grieving process for someone experiencing the loss of a pregnancy.

If laparoscopic surgery was performed, the patient may experience upper abdominal or referred shoulder pain related to carbon dioxide gas inserted into the abdomen during surgery (insufflation). Nurses should provide the patient with instructions to ambulate often and to change positions frequently to assist with movement and absorption of this gas.

If methotrexate is used for the treatment of an ectopic pregnancy, the nurse should educate the patient about its unpleasant side effects (nausea and vomiting) and inform her to avoid alcohol as well as foods and vitamins containing folic acid, which can decrease the effectiveness of the medication. The patient should also avoid sexual intercourse until hCG is undetectable, avoid sun exposure to limit methotrexate dermatitis, and avoid nonsteroidal anti-inflammatory drugs (NSAIDs) (Tulandi, 2019b).

**CASE**

Cora is a 42-year-old newlywed. She comes in to the Women’s Health Clinic complaining of vaginal bleeding and abdominal pain that is completely unlike her usual monthly cramping. She describes her pain as “very sharp” and an “11” on a scale of 0 to 10. Her vital signs are: temperature 98.8°F, pulse 102 beats/min, respirations 24/min, and blood pressure 102/64 mmHg. She indicates that her blood pressure is “usually 130/90 mmHg.” She is unable to recall the date of her last menstrual period. Additionally, she has almost soaked an entire pad in the last hour.

Cora is very anxious and says, “I’ve never had any real female problems before, except for the little cramping I get on the first day of my period. I shouldn’t be having this difficulty because I keep my female parts very clean by douching weekly.” She sheepishly admits to having had gonorrhea five years ago.

**Discussion**

Cora is immediately assessed for an ectopic pregnancy. Her risk factors include: advanced maternal age, regular douching, and history of an STI. She is bleeding heavily and showing evidence of hypovolemia. The priority in this situation is to ensure patient safety by obtaining and sustaining hemodynamic stability. Nursing interventions for Cora will include monitoring
her vital signs, amount of vaginal bleeding, intake and output, and laboratory results. Cora’s nurses are also involved with administering and teaching about prescribed medications (e.g., RhoGAM, methotrexate) and monitoring for potential side effects.
(Case study courtesy of Sharon Walker, RN, MSN.)

Gestational Trophoblastic Disease (GTD)

Gestational trophoblastic disease, most commonly the hydatidiform mole or molar pregnancy, occurs when the chorionic villi of the placenta increase as a result of genetic abnormalities. The villi swell, forming fluid-filled sacs, which have the appearance of tiny clusters of grapes within the uterus. Molar pregnancies are classified as complete or partial based on whether a fetus is present. A partial molar pregnancy occurs when a fetus or an amniotic sac is present, whereas a complete mole only contains the fluid-filled sacs.

The fetus is usually nonviable in a molar pregnancy. However, according to Freis and colleagues (2016), although it is an obstetric rarity, in a twin pregnancy with one fetus and one complete hydatidiform mole, continuation of pregnancy can be considered under close observation.

INCIDENCE AND RISK FACTORS

GTD pregnancies are rare and occur in approximately 1 in 1,000 pregnancies in the United States (ACS, 2017). Patients of advanced maternal age and of Asian descent have a higher risk of molar pregnancy. Additionally, patients who experienced a previous molar pregnancy have a higher risk of molar pregnancy in the future.

SIGNS AND SYMPTOMS

Patients with a GTD exhibit light to heavy bleeding and even hemorrhage. Bleeding can be bright red or watery and brown, appearing similar to prune juice. Anemia may result due to bleeding. Additionally, as a result of the proliferation of tissues and the presence of clotted blood, the uterus may appear larger than expected for gestational age. Despite an enlarged uterus, fetal heart tones and movement are absent. Serum hCG levels are also increased and patients may experience hyperemesis. Symptoms of preeclampsia before 24 weeks’ gestation are a strong indication of gestational trophoblastic disease (ACS, 2017).

MEDICAL MANAGEMENT

Molar tissues are removed by surgical uterine evacuation. Intravenous oxytocin is usually administered to contract the uterus during suction evacuation to increase uterine tone and decrease blood loss. Gentle curettage (scraping of the uterus) is performed to ensure that the uterus is emptied of all affected tissue. However, there is concern that inducing uterine contractions with uterotonics (oxytocin, prostaglandins) in cases of medication-only methods of evacuation will increase the risk of trophoblastic embolization to the lungs or of metastatic disease (Berkowitz et al., 2019).
Patients are followed for one year after removal of a molar pregnancy to detect choriocarcinoma, or cancer associated with GTD. If serum hCG levels do not return to prepregnancy levels, there is a possibility that choriocarcinoma may be present, and further investigation is necessary. Therefore, it is essential that patients understand the need for follow-up.

**NURSING CARE**

It is vital that the nurse monitoring patients experiencing molar pregnancies assess for signs and symptoms of bleeding and shock, including changes in heart rate, blood pressure, and urinary output. If a patient has hyperemesis resulting from the molar pregnancy, the nurse should assist the patient with mouth care and any additional interventions that are appropriate. Nursing care also includes pre- and postoperative care. Laboratory work, including a complete blood count, blood-typing and cross-matching, and serum hCG levels is required prior to vacuum aspiration and curettage.

Rh-negative patients should receive RhoGAM to prevent alloimmunization. As with all pregnancy losses, patients may exhibit grief in response to the loss. Patients should be informed that this is a normal response to a pregnancy loss; therefore, nursing care includes expressing compassion and referring patients to appropriate providers or support groups as needed.

**PATIENT TEACHING**

Due to the risk of choriocarcinoma, it is vital that patients understand the need for regular follow-up to test serum hCG levels. Patients should also understand that another pregnancy immediately following a molar pregnancy should be avoided in order to monitor hCG levels without the interference of hCG from pregnancy. It is important that patients are aware of the signs and symptoms of complications following a molar pregnancy and vacuum aspiration, including excessive bleeding, foul-smelling vaginal discharge, and fever.

Patients should avoid tampons, douches, and sexual activity until the healthcare practitioner indicates that these activities can be performed safely. As a result of bleeding, patients may be anemic and require increased iron intake or possibly iron supplementation. Foods such as liver, green leafy vegetables, dried foods, and eggs can provide needed iron. The patient should also be encouraged to increase fluid intake.

**CASE**

Jill is a 40-year-old prima gravida of Asian descent. The date of her last menstrual period places her at 22 weeks’ gestation, although her fundal height is consistent with 26 weeks’ gestation. She indicates that throughout the pregnancy she has had periodic spotting that resembles prune juice. Jill states, “I knew pregnancy would be difficult at my age in spite of what my grandmother says, but I am vomiting so much that my weight is down to 102 pounds. My blood pressure is up a little, but I guess that’s because of my age, too.”

Jill’s records indicate that her weight at the initial prenatal visit was 110 pounds. Her vital signs are temperature 98.6°F, pulse 86, respirations 20, and blood pressure 142/90, but fetal heart
tones and movement are not detected. She has a small emesis of undigested food while sitting in the waiting room. She states, “It gets harder and harder to keep working in our restaurant.”

**Discussion**

Jill should be assessed for a gestational trophoblastic disease. She has several risk factors and indications for this condition. She is of advanced maternal age and of Asian descent; she is having light bleeding, hyperemesis, and hypertension; and her uterus is larger than expected for gestational age. Following her diagnosis, the nurse may need to address with Jill the loss of her pregnancy and the necessity for follow-up cancer screening.

(Case study courtesy of Sharon Walker, RN, MSN.)

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**BLEEDING COMPLICATIONS: LATE PREGNANCY**

**Placenta Previa**

Placenta previa occurs when the placenta implants in the lower portion of the uterus by the internal cervical os. Previas are classified according to the degree to which they cover the os. Specifically, if the lower border of the placenta is less than 2 cm to the internal cervical os but not covering the os, the placenta is considered *low-lying*. Placenta previa is the complete or partial covering of the internal os of the cervix by the placenta (see illustration). As the pregnancy nears term and the cervix dilates, the placenta implanted near or over the internal cervical os is disrupted and bleeding can occur. The bleeding places the patient and her unborn child at risk.

![Placenta previa with partial covering of the internal os (left) and placenta previa with complete covering of the internal os (right). (Illustration courtesy of Sim London Jr.)](image-url)
PREVALENCE AND RISK FACTORS

Recent systematic review of placenta previa found the prevalence to be 5.2 per 1,000 births (Cresswell et al., 2013). There are several factors that place patients at risk for a placenta previa:

- Previous placenta previa
- Previous cesarean delivery (risk increases with an increasing number of cesarean deliveries)
- Multiple gestation
- Increasing parity
- Increasing maternal age
- Infertility treatment
- Previous abortion
- Previous uterine surgical procedure
- Maternal smoking
- Maternal cocaine use
- Male fetus
- Nonwhite race

(Lockwood & Russo-Stieglitz, 2019a)

SIGNS AND SYMPTOMS

The most significantly recognized symptom of placenta previa is painless, bright-red vaginal bleeding or hemorrhage during late pregnancy. However, bleeding may not occur until labor begins. If there is a diagnosis or high suspicion of placenta previa, it is imperative that vaginal examinations be avoided because stimulation of the placenta may cause hemorrhage.

MATERNAL AND FETAL IMPLICATIONS

As a result of the abnormally implanted placenta, the fetus is often in a transverse or breech position, which may be noted during fundal examination.

The bleeding as a result of placenta previa could cause the patient to hemorrhage and go into shock, and the fetus could experience hypoxia and possibly death from maternal bleeding.

MEDICAL MANAGEMENT

As previously mentioned, vaginal examination must be avoided if a patient presents with painless, bright-red vaginal bleeding because hemorrhage may occur. A transabdominal ultrasound can be performed to diagnose the previa. It may be followed by a transvaginal ultrasound in order to better visualize the cervix and placenta. The ultrasound should be done
with the patient’s bladder empty since an overdistended bladder can compress the anterior lower uterine segment against the posterior lower uterine segment to give the appearance of a previa (Lockwood & Russo-Stieglitz, 2019a). Medical management of a placenta previa is largely determined by gestational age, fetal status, amount of bleeding, and type of previa.

Some patients may deliver vaginally if they are near term, the cervix is ripe, the previa is not total, the fetal heart tracing does not show fetal compromise, and there is minimal bleeding. However, if heart tracings indicate fetal compromise, significant bleeding, or hemorrhage, or a complete previa is present, a cesarean section is usually necessary.

**NURSING CARE**

Nursing care for patients hospitalized with a placenta previa involves close monitoring of bleeding as well as fetal and maternal status. Significant bleeding or hemorrhage should be reported immediately to the appropriate healthcare provider. Careful monitoring of bleeding is imperative, as vital sign changes may not be initially evident. Regular assessment of fetal heart rate (FHR) and movement is necessary. Heart rate patterns that indicate fetal compromise (i.e., recurrent late or prolonged decelerations, absent or marked FHR variability) should be reported to the healthcare practitioner immediately.

Patients with a placenta previa and a history of bleeding should avoid moderate and strenuous exercise, heavy lifting, and standing for prolonged periods. Patients are advised to avoid any sexual activity that may lead to orgasm, since the uterine contractions that result could provoke bleeding (Lockwood & Russo-Stieglitz, 2019b). Nonstress testing to evaluate fetal status is performed during bleeding episodes, while intermittent fetal heart tones are obtained according to medical orders or institutional policy. Patients should be blood-typed and cross-matched in case a blood transfusion is necessary. Blood loss should be quantified. Intravenous access should be maintained for prompt administration of fluids or blood products.

A Kleihauer-Betke laboratory test is usually performed on Rh-negative patients to determine if fetal blood has entered the maternal circulation as a result of fetal-maternal hemorrhage. RhoGAM is given to Rh-negative patients during each bleeding episode to prevent alloimmunization.

**PATIENT TEACHING**

It is extremely important that patients with a placenta previa understand the need to avoid excess physical activity and to call their provider promptly if bleeding or labor occurs. The patient is also encouraged to prohibit vaginal examinations. If asymptomatic, cesarean section should be scheduled at 36 to 37 weeks (Lockwood & Russo-Stieglitz, 2019b).

**CASE**

Megan, a 39-year-old female patient who is pregnant, comes in to the emergency department. Megan is in the 37th week of her fourth pregnancy. She has a history of two elective abortions. A moderate amount of bright-red vaginal blood is noted. Megan is crying loudly and asking for someone to call her husband. She states, “I don’t understand why I’m bleeding! Nothing hurts
at all. I have changed all the bad things in my life. I’ve stopped smoking and using coke. I really, really want this baby.” The nurse evaluates that fetal heart tones and movement are regular and strong.

**Discussion**
Megan will be assessed for placenta previa. She has the following risk factors: history of smoking, drug use, advanced maternal age, and multiple induced abortions. Her current symptom of painless, bright-red bleeding is indicative of the condition. No vaginal examination will be performed and fetal assessment will continue. Megan can expect to be on bed rest and may be hospitalized for continued evaluation and fetal surveillance.

(Case study courtesy of Sharon Walker, RN, MSN.)

**Placental Abruption**

Placental abruption, often referred to as an abruption or abruptio placentae, is the premature separation of the normally implanted placenta from the uterine wall before delivery of the fetus. It is considered an obstetrical emergency. Bleeding occurs between the uterine wall and the placenta.

Placental abruption is classified according to the degree of placental separation and subsequent hemorrhage. An abruption can be partial or complete, with apparent or concealed hemorrhage (see illustrations). An abruption is partial if a section of the placenta separates from the uterine wall but a portion of the placenta remains attached. A complete abruption, the most emergent form, occurs when the entire placenta detaches from the uterine wall. Apparent hemorrhage refers to bleeding that is evident, while a concealed hemorrhage denotes bleeding that is obscured.

A. Partial abruption with concealed hemorrhage
B. Partial abruption with apparent hemorrhage
C. Complete abruption with apparent hemorrhage

(Illustrations by Jason McAlexander. © Wild Iris Medical Education.)
INCIDENCE AND RISK FACTORS

Placental abruptions occur in approximately 1 in 100–120 pregnancies (Ananth & Kinzler, 2019). Aside from abruptions occurring as a result of trauma, the cause of placental abruption is largely unknown. However, there are several factors that place patients at risk for an abruption (in order of strength of association with abruption):

- Previous abruption
- Abdominal trauma/accidents
- Cocaine or other drug abuse
- Eclampsia
- Polyhydramnios
- Chronic hypertension
- Preeclampsia/gestational hypertension
- Prelabor rupture of membranes
- Chorioamnionitis
- Preeclampsia
- Fetal growth restriction/small for gestational age
- Smoking during pregnancy
- Maternal age
- Parity
- Male infant sex
  (Ananth & Kinzler, 2019)

SIGNS AND SYMPTOMS

The classic signs and symptoms of placental abruption include an abrupt onset of vaginal bleeding, which may be dark red due to old blood from a concealed abruption; uterine tenderness; and a board-like abdomen. Patients often complain of an aching or dull pain in the abdomen or lower back. Additionally, frequent uterine contractions with poor uterine resting tone (the baseline pressure of the uterus between contractions) is frequently noted.

MATERNAL AND FETAL IMPLICATIONS

Placental abruption is a potentially life-threatening event for the patient and the fetus, depending on the severity of the abruption. Patients with an abruption are at risk for developing hypovolemic shock, disseminated intravascular coagulation (DIC), and possibly death. Patients may also suffer from postpartum hemorrhage after delivery due to poor contractility of the uterus following an abruption. Since the placenta is the source of oxygenation for the unborn fetus,
premature separation of the placenta from the uterine wall can place the fetus at great risk for hypoxia and death.

**MEDICAL TREATMENT**

Placental abruption is usually diagnosed by abdominal ultrasound in addition to the presenting signs and symptoms. Treatment is based on the degree of placental separation and subsequent hemorrhage as well as the status of the patient and fetus. In the presence of severe abruption and hemorrhage, emergency cesarean section is performed unless delivery is imminent.

**NURSING CARE**

Although vaginal delivery is preferred to cesarean section for patients who are hemodynamically stable, the nurse must be prepared to deal with the possibility of severe hemorrhage and hypovolemic shock, as well as the resulting fetal distress. Patients should have intravenous access with a large-bore catheter to accommodate the administration of fluid and blood products.

It is necessary to monitor carefully the status of the patient and fetus. Frequent vital signs and fetal heart tones, as well as monitoring and documentation of blood loss, is essential. Maternal bleeding may be indicated by falling hemoglobin and hematocrit or abnormal CBC (complete blood count). Abnormal vital signs, bleeding, or fetal heart patterns indicating fetal compromise should be reported immediately to the appropriate healthcare provider. Observation and documentation of the patient’s intake and output and pain and comfort levels are also essential. Patients should be blood-typed and cross-matched in case a blood transfusion is necessary. RhoGAM is indicated for Rh-negative patients.

<table>
<thead>
<tr>
<th>NORMAL HEMATOLOGIC VALUES</th>
<th>Nonpregnant</th>
<th>Pregnant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin (HGB)</td>
<td>12–16 gm/dl</td>
<td>11.5–15 gm/dl</td>
</tr>
<tr>
<td>Hematocrit (HCT)</td>
<td>36%–48%</td>
<td>32%–36.5%</td>
</tr>
<tr>
<td>Red blood cells (RBC)</td>
<td>4–5.3</td>
<td>No change</td>
</tr>
</tbody>
</table>

Fetal bleeding may be indicated by electronic fetal monitoring changes such as tachycardia followed by bradycardia, absent variability, decelerations, and/or sinusoidal tracing. A Kleihauer-Betke (KB) screen may be ordered to look for fetal blood cells that have entered maternal circulation; normally there are none.

Because the potential for patient and fetal injury is high in the presence of placental abruption, it is important to address the emotional needs of the patient. Patients should be kept informed of the status of the fetus, and the nurse should be available and ready to answer any questions that patients or their families may have.
PATIENT TEACHING

Patients should be instructed to report bleeding and severe abdominal pain immediately. It is important to inform patients with placental abruption that emergency delivery may be necessary. If a patient must have an emergency cesarean section, it is important for the nurse to quickly communicate to the patient and her family what will occur before and during the procedure. Nurses should remember that hemorrhage and emergency surgery can be very frightening; therefore, clear and honest information must be given to the patient and her family as frequently as possible.

CASE

Rebecca has her first prenatal visit at 30 weeks’ gestation. She is extremely quiet, holds her head down, and stays very close to her husband, speaking in whispers only to him. Rebecca’s husband then repeats her comments and questions to the nurse and clinic staff. Her uterine height and the fetal heart tones are all within normal limits. However, the nurse observes multiple bruises in various stages of healing on the patient’s torso and legs and a moderate amount of dark vaginal blood on her peri-pad. Although Rebecca (through her husband) denies any pain, she is sweating profusely and seems to have abdominal pain.

Discussion

The presence of bruises at various stages of healing and Rebecca’s dependence on her partner to answer for her are possible indications of intimate partner violence. There is also a possibility of placental abruption related to abdominal trauma. The patient has dark red vaginal bleeding and evidence of abdominal pain. It is important for the healthcare practitioner to speak with Rebecca in private to discern the cause of her bruising and possible abuse. In addition, the nurse must ensure the safety of the patient and her unborn child.

(Case study courtesy of Sharon Walker, RN, MSN.)

<table>
<thead>
<tr>
<th>PLACENTA PREVIA VS. PLACENTAL ABRUPTION</th>
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<tbody>
<tr>
<td><strong>Assessment</strong></td>
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<tr>
<td>Pain</td>
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<tr>
<td>Bleeding</td>
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<tr>
<td>Uterus</td>
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<tr>
<td>Risk for postpartum hemorrhage</td>
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</table>
HYPEREMESIS GRAVIDARUM

Nausea and vomiting occur normally during pregnancy. However, nausea and vomiting that occurs regularly beyond the 20th week of gestation and involves hypovolemia and weight loss (greater than 5% of prepregnancy body weight) during pregnancy is termed *hyperemesis gravidarum*, or severe, persistent nausea and vomiting. The cause of hyperemesis is unknown, however elevated hormonal levels and relaxation of smooth muscle resulting in delayed stomach emptying, along with stress, are believed to play a part in this disorder.

**Incidence**

Nausea and vomiting occur 90% of the time in pregnancy, mainly during the first trimester. However, hyperemesis gravidarum affects approximately 0.3% to 3% of pregnancies (Matthews et al., 2015). Depending on the severity of the condition, patients suffering from hyperemesis may be hospitalized or admitted to home-care services for monitoring.

**Signs and Symptoms**

Normal first-trimester nausea and vomiting can be challenging for pregnant women. However, patients with hyperemesis gravidarum are frequently debilitated by unrelenting vomiting and dry retching. Common signs and symptoms of hyperemesis gravidarum include:

- Poor appetite
- Poor nutritional intake
- Vomiting beyond 20 weeks’ gestation
- Significant weight loss (>5% of prepregnancy weight)
- Ketonuria unrelated to other causes
- Dehydration (dry mouth and mucous membranes, decreased skin elasticity [turgor], and dark, concentrated urine)

**Maternal and Fetal Implications**

Patients with hyperemesis gravidarum frequently become dehydrated and may have metabolic acidosis as a result of starvation. In addition, patients may become alkalotic from a loss of hydrochloric acid during vomiting. Electrolyte imbalances such as hypokalemia and vitamin deficiencies are also common in patients with hyperemesis gravidarum. Ultimately, long-term nausea and vomiting can cause renal and/or gastrointestinal impairment in the pregnant patient.

Dehydration occurring from hyperemesis gravidarum may result in preterm labor, which can negatively impact the fetus. In addition, dehydration impairs placental perfusion and affects nutrient intake and oxygenation of the fetus. Moreover, due to the severe nausea and vomiting associated with hyperemesis, poor maternal nutrient intake is common and fetal growth may be compromised, causing low-birth-weight infants.
Medical Treatment

When diagnosing hyperemesis gravidarum, it is important to investigate the underlying causes of nausea and vomiting. These causes can include gastroenteritis, pancreatitis, hepatitis, peptic ulcer disease, and pyelonephritis. Patients usually require intravenous fluids and antiemetics to manage hyperemesis. While most care for hyperemesis is provided in the patient’s home, some patients may require hospitalization for nutritional support via enteral or parenteral access.

Nursing Care

The nurse caring for patients with hyperemesis gravidarum includes monitoring and providing physical care as well as psychosocial support to patients. The nurse will administer IV fluids and antiemetics. Intake and output are carefully monitored, as well as gastrointestinal status. Laboratory results (e.g., ketones, electrolytes, complete blood count, liver enzymes) should be carefully monitored, with abnormal results reported to the appropriate healthcare practitioner. It is important to monitor for weight loss. The constant, prolonged nausea and vomiting associated with hyperemesis may easily result in malnutrition for pregnant patients.

Often patients are unable to work or tend to activities of daily living. This underscores the need for the nurse to address the psychosocial needs of patients, which may involve simply listening to the patient or a referral to appropriate resources.

Patient Teaching

Most of the nursing care provided to patients with hyperemesis gravidarum involves teaching the patient to deal with the associated nausea and vomiting. It is important for patients to understand the need to eat small, frequent low-fat meals throughout the day. Usually toast, dry cereal, and other bland foods such as bananas, rice, and apples are well tolerated. Consistent protein intake is also helpful in preventing nausea (Smith et al., 2019). Patients should be instructed to identify and avoid foods and odors that trigger nausea and vomiting.

In addition, patients should be encouraged to maintain adequate fluid intake to prevent dehydration. Since constant, prolonged vomiting affects the patient’s mouth and desire to eat, nurses also teach and encourage patients to provide and maintain adequate oral care.

Patients may also be prescribed antiemetics. It is important to provide appropriate instructions regarding their medications.

Positive ketones in the urine indicate that patients are using fat stores to provide energy to themselves and their growing fetuses. Therefore, patients may be required to use urine dipsticks to monitor ketones while at home. The nurse will need to instruct patients in the appropriate use of the urine dipsticks.

Nurses should instruct patients to notify their healthcare practitioner if they notice dark urine, bloody vomitus, abdominal pain, dehydration, lack of urine output for eight hours, positive ketones, or inability to keep food down for 24 hours.
CASE

Deanna is in the 10th week of her first pregnancy. She has come to the second prenatal visit stating she has many questions: “I thought you got bigger when you have a baby. I started out weighing 130 pounds, and on your scale I now weigh 121. Is it because of all the barfing?”

Deanna describes vomiting four to six times per day: in the morning as soon as she gets out of bed, sometimes after eating lunch, and after eating dinner. “If I’m not actually barfing, I can’t look at food because I feel like I will. My mom said its normal to have morning sickness, but it’s not called ‘all-day sickness,’ is it?”

Deanna’s urine is amber-colored. She has poor skin turgor, flaking skin over much of her body, and sticky mucous membranes. “My husband is really beginning to complain about my not cooking anything. But really, if I smell any food, everything I’ve eaten comes up. I spew like a volcano. My husband has taken to calling me Mt. Vesuvius.”

Discussion

Deanna should be assessed further for hyperemesis gravidarum. She has decreased turgor, dry skin, and sticky mucous membranes. Deanna reports constant nausea and frequent vomiting. Her weight loss is more than 5% of her prepregnancy weight, and her urine is concentrated. The nurse should work with Deanna on interventions for improving her intake and curtailing the symptoms of hyperemesis.

(Case study courtesy of Sharon Walker, RN, MSN.)

PREGNANCY-RELATED HYPERTENSIVE COMPLICATIONS

Gestational hypertension (formerly known as pregnancy-induced hypertension) is hypertension occurring for the first time after 20 weeks of gestation. Diagnosis of gestational hypertension requires a blood pressure ≥140/90 mmHg. The blood pressure should be elevated on at least two occasions at least four hours apart. The diagnosis is characterized by a blood pressure that returns to normal by 12 weeks postpartum. If it does not return to normal, it is considered preexisting hypertension. Patients with gestational hypertension do not present with proteinuria or new signs of end-organ dysfunction, which are characteristics of preeclampsia; however, gestational hypertension may progress to preeclampsia (Magloire & Funai, 2019).

Preeclampsia is identified by a systolic blood pressure ≥140 mmHg or a diastolic blood pressure ≥90 mmHg on two occasions at least four hours apart after 20 weeks of gestation in a previously normotensive patient (or systolic blood pressure ≥160 mmHg or diastolic blood pressure ≥110 mmHg on one occasion) in the presence of protein in the urine (proteinuria) or end-organ dysfunction (August, 2019).

Eclampsia is the occurrence of grand mal seizures in the presence of preeclampsia without other known cause for the seizure. Seizures can occur anytime before, during, or after delivery of the fetus.
Chronic hypertension is defined by a systolic blood pressure $\geq 140$ mmHg and/or diastolic pressure $\geq 90$ mmHg on at least two occasions that is present prior to pregnancy, presents before the 20th week of pregnancy, or persists longer than 12 weeks postpartum.

Preeclampsia superimposed on chronic hypertension is diagnosed in a patient with chronic hypertension who develops worsening hypertension with new onset proteinuria or other features of preeclampsia (e.g., elevated liver enzymes, low platelet count) (August, 2019). Medical treatment and nursing care for patients with preeclampsia superimposed on chronic hypertension is similar to that of gestational hypertension and preeclampsia. Patients with preeclampsia superimposed on chronic hypertension are often treated with antihypertensive agents.

### CRITERIA FOR THE DIAGNOSIS OF PREECLAMPSIA

- Systolic blood pressure $\geq 140$ mmHg or diastolic blood pressure $\geq 90$ mmHg on two occasions at least four hours apart after 20 weeks of gestation in a previously normotensive patient. (If systolic blood pressure is $\geq 160$ mmHg or diastolic blood pressure is $\geq 110$ mmHg, confirmation within minutes is sufficient.)

And one or more of the following:

- Proteinuria $\geq 0.3$ grams in a 24-hour urine specimen or protein (mg/dL)/creatinine (mg/dL) ratio $\geq 0.3$ in a random urine specimen or dipstick $\geq 2+$ if a quantitative measurement is unavailable
- Platelet count $<100,000$/microL
- Serum creatinine $>1.1$ mg/dL (97.2 micromol/L) or doubling of the creatinine concentration in the absence of other renal disease
- Liver transaminases at least twice the upper limit of the normal concentrations for the local laboratory
- Pulmonary edema
- Cerebral or visual symptoms (e.g., new-onset and persistent headaches not accounted for by alternative diagnoses and not responding to usual doses of analgesics; blurred vision, flashing lights or sparks, scotomata) (ACOG, 2019)

### Prevalence and Risk Factors

Gestational hypertension is the most common cause of hypertension in pregnancy. Between 6%–17% of healthy and nulliparous women are affected, and 2% to 4% of multiparous women. Prevalence is highest in women with preeclampsia in a previous pregnancy, women with multifetal gestation, and women who are overweight or obese (Magloire & Funai, 2019). Gestational hypertension is a significant contributor to maternal and fetal mortality rates.
HYPERTENSION AND SNORING

Among pregnant women, the prevalence of self-reported snoring has been estimated to be between 14%–46%, with snoring prevalence increasing as gestation advances. Higher rates of gestational hypertension, preeclampsia, and delivery of small-for-gestational-age infants have been reported among habitual snorers compared to nonsnorers (Louis & Pien, 2019).

NORMAL MATERNAL CARDIOVASCULAR CHANGES OF PREGNANCY

Maternal circulation changes during pregnancy to accommodate an increase in blood volume of up to 50%. Due to the increase in workload, a split first heart sound, a systolic murmur, or even a third heart sound may be heard upon auscultation. The increased blood volume peaks in the third trimester and returns to prepregnant state somewhere around 6–12 weeks postpartum (Blackburn, 2017).

The increased blood supply includes a 45%–50% increase in plasma volume and 20%–30% increase in red blood cells. Since these percentages are not equal, the subsequent hemoglobin (HGB)/hematocrit (HCT) will reflect a normal physiologic anemia of pregnancy. The HCT will appear to fall as the volume increases more than the packed cell count.

During pregnancy, the systemic vascular resistance (SVR) of the blood vessels lowers due to increased levels of hormones. This decreasing SVR is an expected result of the increasing progesterone and prostaglandin levels, which relax smooth muscle, producing vasodilatation. As a result of the increased volume and decreased resistance, cardiac output rises. Therefore, there is a normal lowering of the blood pressure, especially in the second trimester. This sometimes causes dizziness or feeling faint in women as they rise to standing during the second trimester. Their pressure should stabilize and approach prepregnancy numbers by the third trimester. An abnormal rise in blood pressure could be an indication of preeclampsia, which involves multiple systems of the patient.

Pathophysiology

Vasospasm in the arterioles of patients with gestational hypertension causes increased blood pressure and a decrease in placenta and uterine perfusion. Renal blood flow is reduced, along with the renal glomerular filtration rate, which produces proteinuria. Headaches and visual disturbances are the result of cellular damage and cerebral edema caused by central nervous system changes in the presence of hypertension. Liver enlargement is the result of hepatic changes that lead to epigastric pain. Generalized vasospasm causes endothelial cell damage, which triggers coagulation pathways, and subsequently, abnormalities in bleeding and clotting can occur.
CRITERIA FOR THE DIAGNOSIS OF PREECLAMPSIA WITH SEVERE FEATURES

The presence of one or more of the following indicates a diagnosis of preeclampsia with severe features:

- Severe blood pressure elevation: Systolic blood pressure $\geq 160$ mmHg or diastolic blood pressure $\geq 110$ mmHg on two occasions at least four hours apart while the patient is on bedrest (antihypertensive therapy may be initiated upon confirmation of severe hypertension, in which case criteria for severe blood pressure elevation can be satisfied without waiting until four hours have elapsed)

- Symptoms of central nervous system dysfunction:
  - New onset cerebral or visual disturbance, such as photopsia, scotomata, cortical blindness, retinal vasospasm
  - Severe headache (i.e., incapacitating, “the worst headache I've ever had”), or headache that persists and progresses despite analgesic therapy and not accounted for by alternative diagnoses

- Hepatic abnormality: Severe persistent right upper quadrant or epigastric pain unresponsive to medication and not accounted for by an alternative diagnosis or serum transaminase concentration $\geq$ twice the upper limit of the normal range, or both

- Thrombocytopenia: $<100,000$ platelets/microL

- Renal abnormality: Progressive renal insufficiency (serum creatinine $>1.1$ mg/dL or doubling of serum creatinine concentration in the absence of other renal disease)

- Pulmonary edema (ACOG, 2019)

Maternal and Fetal Implications

Hypertension in pregnancy places patients and their fetuses at great risk for a variety of complications. Some of the most significant maternal complications of hypertension in pregnancy include cerebral vascular accident (CVA, or stroke), disseminated intravascular coagulation (DIC), and placental abruption from the elevated blood pressure.

Additionally, patients are at risk for the development of HELLP syndrome in the presence of gestational hypertension. Just as its name implies, HELLP syndrome causes great dysfunction within the body and requires immediate intervention. It is characterized by:

- Hemolysis of red blood cells, which leads to anemia
- Elevated liver enzymes, leading to epigastric pain
- Low platelets, which cause abnormal bleeding and clotting as well as petechiae
Patients with HELLP syndrome whose function continues to decline without intervention can develop eclampsia and are at risk for DIC, placental abruption, acute renal failure, pulmonary edema, subcapsular liver hematoma, and retinal detachment (Sibai, 2019). Fetal complications include intrauterine growth retardation and premature delivery resulting from decreased placenta perfusion.

The exact pathophysiology of HELLP syndrome is not known. It has been attributed to abnormal placentation, similar to preeclampsia, but with greater hepatic inflammation and greater activation of the coagulation system than in preeclampsia (Sibai, 2019).

Medical Treatment

Medical treatment for patients with gestational hypertension greatly depends on the severity of hypertension and the gestational age of the fetus, as well as the potential risk to the patient and fetus. During early pregnancy, outpatient management is usually appropriate; these patients are monitored at home for blood pressure, proteinuria, and other signs and symptoms of preeclampsia. Regular fetal monitoring is necessary to evaluate fetal well-being. In addition, placental perfusion tests can be performed to assess and monitor uteroplacental sufficiency. Patients with evidence of severe dysfunction such as seizures, oliguria, renal failure, or HELLP syndrome are usually delivered immediately.

Since delivery is the only known cure for gestational hypertension, many healthcare practitioners will recommend immediate induction and delivery if the patient is near-term and shows signs of preeclampsia with severe features or eclampsia. However, if the healthcare practitioner determines that the fetus is too premature for delivery, antihypertensive medications (labetalol, hydralazine, nifedipine, or nitroprusside) may be administered to decrease blood pressure, thereby prolonging fetal growth in utero. Glucocorticoids may be administered to enhance fetal lung maturity. Low-dose aspirin started prior to 20 weeks’ gestation for patients with average or high risk of developing preeclampsia may be given to decrease the likelihood of developing preeclampsia or its subsequent placental and fetal effects (Magloire & Funai, 2019).

Healthcare practitioners may prescribe magnesium sulfate (MgSO4) during labor and delivery to prevent seizures and for fetal/neonatal neuroprotection in pregnancies between 24–32 weeks of gestation. Magnesium sulfate is not used to control hypertension. Magnesium sulfate is administered intravenously via an infusion delivery device during delivery and for 24 hours post delivery. Since MgSO4 can cause fetal respiratory depression following delivery, arrangements should be made for specialized neonatal care.

As stated by Norwitz (2019), the mechanism for the anticonvulsant effects of magnesium sulfate has not been clearly defined. The primary effect is thought to be central. Hypotheses include:

- Raising the seizure threshold by its action at the n-methyl d-aspartate (NMDA) receptor
- Membrane stabilization in the central nervous system secondary to its actions as a nonspecific calcium channel blocker
- Decreasing acetylcholine transmission in motor nerve terminals
• Promoting vasodilatation of constricted cerebral vessels by opposing calcium-dependent arterial vasospasm, thereby reducing cerebral barotrauma

Nursing Care

Gestational hypertension presents a great risk to patients and their unborn fetuses. Therefore, it is the responsibility of the nurse to monitor the patient carefully for signs of a decline in health status. The nurse should immediately report increases in blood pressure, visual disturbance changes, severe headaches, epigastric pain, and oliguria to the appropriate healthcare practitioner.

**ASSESSING FOR PREECLAMPSIA COMPLICATIONS AND TREATMENTS**

The following tests, signs, and symptoms are used to assess for complications or treatments of preeclampsia:

- **DIC panel.** A patient with preeclampsia with severe features may develop HELLP syndrome and/or DIC.

- **Magnesium level.** Preeclamptic patients on IV magnesium sulfate may have laboratory values drawn to establish therapeutic goals.
  
  o A normal magnesium level in an unsupplemented patient is 1.5–2.5 mg/dL (mEq/L).
  
  o The goal is 4–7 mg/dL (mEq/L) for patients receiving IV magnesium therapy.
  
  o Magnesium levels >9 mg/dL (mEq/L) are potentially life threatening.

- **Liver function panel.** Used to assess whether preeclampsia is causing liver organ damage and/or HELLP syndrome. Assessment of the patient will reveal abdominal pain and tenderness in the upper right quadrant, which may be caused by microclots and lead to liver capsular edema.

- **24-hour urine protein or protein:creatinine ratio.** Assesses whether kidney function is being affected by vascular spasming and microclotting found with preeclampsia. A 24-hour urine protein level of >300 mg is indicative of mild preeclampsia; a level of >5 gm is indicative of severe preeclampsia. A protein (mg/dL):creatinine (mg/dL) ratio of ≥0.3 in a random urine specimen indicates preeclampsia. A patient with falling urinary output is especially at risk for magnesium overdose if clots from preeclamptic processes are affecting the renal blood flow.

- **Neurological signs.** Edema from leaking vascular tissue puts pressure on the optic nerve, and patients may report a distortion in their vision. Edema in the brain can cause severe headache and potentially life-threatening seizures.
While patients are hospitalized for gestational hypertension, the nurse will monitor the patient’s blood pressure and the well-being of the fetus. If magnesium sulfate (MgSO₄) is prescribed for preeclampsia or eclampsia, a Foley catheter is usually inserted to monitor urine output and to obtain regular urine specimens.

The nurse is responsible for administering MgSO₄ and for monitoring its toxicity. **Magnesium sulfate toxicity** can be prevented by ensuring that urine output is adequate (at least 30 ml/hour), deep tendon reflexes are present, and the respiratory rate is greater than 12 breaths per minute. If MgSO₄ toxicity is noted, the healthcare practitioner must be notified immediately and the infusion discontinued. Calcium gluconate can be administered when prescribed to reverse the effects of MgSO₄ toxicity. It is not necessary to check for a therapeutic drug level, as there does not appear to be a clear threshold concentration for ensuring the prevention of seizures; however, a retrospective study suggests the serum magnesium level for patients receiving MgSO₄ should be 4.8–8.4 mg/dL (Norwitz, 2019).

In the presence of eclampsia, the nurse must be prepared to prevent injury to the patient during seizures and to monitor seizure activity. Bedside rails should be up and padded. Emergency equipment should be readily available, including oxygen, a nonrebreather face mask, and emergency medication.

In the event of a seizure, patients should be protected from injury. The nurse should note the beginning and ending of the seizure and ensure adequate oxygenation after seizure activity has ceased. The nurse should not attempt to insert any object into the mouth during a seizure. The patient should be placed in a lateral position if possible, or the head can be gently turned to the side to prevent the aspiration of mucus and emesis into the lungs during seizure activity. The nurse may provide oxygen by nonrebreather mask during the seizure. The nurse obtains vital signs and monitors the fetus following the seizure.

Labor may progress rapidly during seizure activity. Sometimes newborns are delivered suddenly during a seizure. The nurse should be prepared for an imminent delivery in patients with preeclampsia and eclampsia.

**Patient Teaching**

Patients suffering from gestational hypertension who are being treated on an outpatient basis are taught to monitor themselves and their unborn child for a decline in health status. Specifically, patients are taught to notify their healthcare practitioner if they experience headaches, visual disturbances, epigastric pain, or sudden weight gain. Patients may be taught to monitor their weight, blood pressure, and urine protein at home. They are instructed to notify the appropriate healthcare practitioner of elevated blood pressures or symptoms suggestive of preeclampsia (headache, visual changes, epigastric or right upper quadrant pain). They are also instructed to perform daily fetal kick counts to monitor fetal well-being and to increase protein intake because proteinuria decreases the amount of available protein.

The nurse encourages patients with gestational hypertension to rest in the side-lying position as much as possible, whether at home or in the hospital. This position prevents unnecessary
pressure on the vena cava, which decreases renal and placental blood flow and leads to increased blood pressure. The patient is also instructed to decrease environmental stimuli by lowering or turning off lights and by decreasing the volume on radios or televisions as well as decreasing the number of visitors.

Nursing care is performed in a manner that prevents unnecessary disturbances to the patient’s environment while hospitalized. Stress and anxiety is a major concern in patients with gestational hypertension, as they can lead to increased blood pressure. Therefore, the nurse should discuss stress and anxiety management with patients.

CASE

Eden, a 16-year-old, comes to the OB clinic for her regular checkup. She is pregnant for the first time, with twins, and is in her 37th week of gestation. When her name is called, she rushes in to the examination room saying, “I’m so glad my appointment was today. I would’ve come in even if it weren’t. Mom couldn’t make it today. I had to catch the bus. My head feels like it’s going to explode and my face has gotten fat like my belly. I can’t wait for this whole thing to be over.”

Eden’s vital signs are temperature 98.2 °F, pulse 70, respirations 20, and blood pressure 150/98. Her urine is 2+ for protein. Pitting edema of +2 is noted bilaterally in the lower extremities. The fetal heart rates are in the 150s for both fetuses. Eden’s mother usually attends prenatal appointments and has talked in the past about the seizures she experienced when she was pregnant with Eden.

Discussion

Eden is assessed thoroughly for complications associated with gestational hypertension. She has some risk factors and exhibits several symptoms. Eden is very young, is pregnant with twins, and has a family history of eclampsia. She has proteinuria, facial edema, and edema of the lower extremities.

Eden may be hospitalized on bed rest for evaluation of her condition. Her vital signs will be closely monitored with attention to fetal well-being; urinary output; and reports of headache, visual disturbances, and epigastric pain. The goals of hospitalization for Eden include prevention of seizure and promotion of a safe delivery. Since Eden is so close to her due date, an induced delivery may be considered.

(Case study courtesy of Sharon Walker, RN, MSN.)

GESTATIONAL DIABETES MELLITUS (GDM)

Gestational diabetes mellitus occurs with the onset of pregnancy and is characterized by the inability of the pregnant patient to tolerate glucose. Patients who develop gestational diabetes may develop diabetes later in life. However, gestational diabetes often resolves after delivery.
In pregnancy, glucose demands increase as the fetus grows. The “insulin-antagonistic” properties of placental hormones affect the patient by causing normal insulin resistance of pregnancy. This allows a proper supply of glucose for the growing fetus. In gestational diabetes mellitus, the pregnant patient’s pancreas is not able to keep up with the higher demand for insulin to overcome the insulin resistance. As a result, the pregnant patient is unable to process glucose in the body and hyperglycemia occurs (Durnwald, 2019a).

**Prevalence and Risk Factors**

According to the Centers for Disease Control and Prevention (Deputy et al., 2018), gestational diabetes affects up to 6% of pregnancies. Factors that place patients at risk for developing gestational diabetes mellitus include:

- Personal history of impaired glucose tolerance, A1C ≥5.7%, impaired fasting glucose, or gestational diabetes mellitus in a previous pregnancy
- Member of one of the following ethnic groups (which have a high prevalence of type 2 diabetes): Hispanic American, African American, Native American, South or East Asian, Pacific Islander
- Family history of diabetes, especially in first-degree relatives
- Prepregnancy weight ≥110% of ideal body weight or BMI >30 kg/m², significant weight gain in early adulthood and between pregnancies, or excessive gestational weight gain during the first 18–24 weeks
- Older maternal age (>25 or 30 years of age)
- Previous unexplained perinatal loss or birth of a malformed infant
- Glycosuria at the first prenatal visit
- Previous birth of an infant weighing ≥4–4.5 kg (approximately 9–10 pounds)
- High density lipoprotein <35 mg/dL (0.90 mmol/L), triglyceride >250 mg/dL (2.82 mmol/L)
- Medical condition/setting associated with development of diabetes, such as metabolic syndrome, polycystic ovary syndrome, current use of glucocorticoids, hypertension or cardiovascular disease, acanthosis nigricans (Durnwald, 2019a)

Women who have had GDM are also more than nine times as likely to develop type 2 diabetes (Durnwald, 2019b).
Maternal and Fetal Complications

A variety of maternal and fetal complications are associated with GDM. Patients have a significant chance of delivering via cesarean section due to the large size of infants born to patients with GDM. Patients also have an increased frequency of gestational hypertension, preeclampsia, polyhydramnios, and stillbirth.

Infants born to patients with gestational diabetes mellitus are significantly more likely to be macrosomic (birthweight >4.5 kg). This occurs due to fetal hyperinsulinemia as a result of maternal hyperglycemia, which stimulates excessive growth. These large infants may have difficulty maneuvering the birth canal, and a cesarean section may be required. If vaginal delivery is attempted, the infant is at risk for shoulder dystocia and related birth injuries.

After delivery, the newborn infant’s blood glucose must be monitored regularly for hypoglycemia due to the sharp decrease in available glucose after the umbilical cord is cut. The newborn’s pancreas continues to produce insulin after delivery despite the decrease in serum glucose. This adds to the potential instability of the infant’s blood glucose. Infants are also at risk for hypocalcemia, hyperbilirubinemia, hypomagnesemia, polycythemia, cardiomyopathy, and respiratory distress syndrome as a result of gestational diabetes (Durnwald, 2019a).

PREEXISTING DIABETES MELLITUS

In addition to the risks associated with GDM, women with pregestational diabetes mellitus (type 1 or type 2) are at risk for their children to have congenital anomalies related to hyperglycemia during early pregnancy and organ development. The prevalence of preexisting diabetes mellitus among women with a live birth in 2016 was 0.8% (Deputy et al., 2018).

Medical Treatment

Pregnant patients are routinely screened for GDM at 24–28 weeks’ gestation. In order to diagnose gestational diabetes, patients drink 50 grams of oral glucose solution. After one hour, a blood sample is obtained and tested for glucose tolerance. A glucose level of 130–140 mg/dL or higher is considered a positive screen, and further investigation is warranted. A three-hour glucose tolerance test is then typically performed.

Most patients with GDM are treated through diet. Patients are encouraged to eat three small meals per day and two to four healthy snacks. It is important to avoid sweet desserts and beverages and to avoid adding sugar to food or drinks. Alternative sweeteners may be used. Patients are instructed to eat protein and moderate portions of carbohydrates, choosing whole grains when possible. Patients are also reminded to include healthy fats and vegetables. Besides adherence to proper diet and exercise, some patients may require insulin or oral hypoglycemia agents to manage gestational diabetes mellitus.
Nursing Care

It is important for the nurse to monitor serum glucose levels throughout the pregnancy of patients with GDM. A referral to a dietitian may also be necessary. The nurse may also conduct regular fetal surveillance, including nonstress tests or biophysical profiles starting at 32–36 weeks’ gestation and until delivery.

During labor, the patient with gestational diabetes mellitus may need to be on intravenous insulin and glucose. Blood glucose levels will be monitored regularly according to medical orders or institutional policies, which may be as often as every hour.

After delivery, the nurse is responsible for monitoring the infant’s blood glucose levels, since hypoglycemia is common in newborns born to patients with GDM. If the newborn’s blood glucose level is below acceptable national or institutional standards (usually <40 mg/dL), treatment with intravenous fluids, intravenous or oral glucose, or early feedings is necessary. Nurses must be aware of signs and symptoms of hypoglycemia in the newborn, including jitteriness, tremors, irritability, lethargy, seizures, tachypnea, temperature instability, and/or poor feeding and take appropriate action to assist in the treatment of hypoglycemia.

Patient Teaching

The nurse working with patients who are diagnosed with GDM is often responsible for teaching the patient to self-monitor and record glucose at home. In addition, the nurse may teach patients about proper diet and safe exercise during pregnancy. During prenatal visits, the nurse reviews the blood glucose and diet logs to make recommendations about monitoring, medication administration, and diet. Patients may also need to learn how to self-administer insulin. The nurse ensures that the patient can comfortably and appropriately check blood glucose levels and administer insulin by requesting a return demonstration.

It is imperative that the nurse teach patients with gestational diabetes the signs and symptoms of hypoglycemia. These signs and symptoms include shakiness, anxiety, headache, hunger, cold, clammy skin, and tingling around the mouth. The patient is taught to closely monitor for hypoglycemia and to notify her healthcare practitioner immediately if signs and symptoms are noted.

Hypoglycemia in women with GDM is treated by immediately eating 10–20 g of a mixed protein and carbohydrate snack. This snack tends to dampen the rapid elevation of glucose followed by rapid decline that can result in pregnant women with diabetes from consuming a pure simple sugar (Durnwald, 2019b).

Since the potential for developing diabetes is significant in patients with gestational diabetes, it is important that patients understand the need for follow-up evaluation after delivery. Patients should continue to watch for signs and symptoms of hypo/hyperglycemia and notify their healthcare practitioner if seen.
OBESITY IN PREGNANCY

The prevalence of obesity in reproductive-age women is 34%. One quarter of pregnancy complications (e.g., gestational hypertension, preeclampsia, gestational diabetes, preterm birth) are attributable to maternal overweight/obesity, and almost one third of large-for-gestational-age infants are attributable to excessive gestational weight gain (Ramsey & Schenken, 2019). Given the magnitude of this issue, it is imperative that patients be educated about the benefits of diet and exercise during preconception counseling and during the pregnancy.

CASE

Agnes is a 31-year-old patient who is pregnant for the fourth time. She has one living child, born at 36 weeks’ gestation and weighing 11 pounds. Agnes also had a stillborn baby born at 36 weeks and one pregnancy loss. At her routine 28-week prenatal visit, she arrives early to drink a 50-gram dose of glucose cola and have blood drawn for the oral glucose challenge test. The results of the test are abnormal.

Discussion

Agnes shows signs of gestational diabetes mellitus, both currently and in her previous pregnancies. A macrosomic infant, a stillborn, and a pregnancy loss are indicative of GDM. The nurse teaches Agnes how to monitor her blood glucose levels and self-administer insulin. The nurse also stresses to Agnes the importance of proper diet and blood glucose control for her health and the health of her unborn baby.

(Case study courtesy of Sharon Walker, RN, MSN.)

AMNIOTIC MEMBRANE COMPLICATIONS

Prelabor rupture of membranes (PROM) (previously known as premature rupture of membranes) refers to the rupture of membranes one hour or more before the onset of labor.

Preterm prelabor rupture of membranes (PPROM) (previously known as preterm premature rupture of membranes) refers to the rupture of membranes prior to 37 weeks’ gestation. PPROM is often associated with preterm labor and birth.

Incidence and Risk Factors

PPROM occurs in 3% of pregnancies and is the cause of, or associated with, one third of preterm deliveries (Duff, 2019); PROM occurs in 8% of all pregnancies (Scorza, 2019). Risk factors for PPROM with a strong association include:

- Previous PPROM
- Genital tract infection
- Antepartum bleeding
• Cigarette smoking
  (Duff, 2019)

**Maternal and Fetal Implications**

PPROM can cause a variety of problems, especially for the unborn fetus. Without the protective barrier of the amniotic membrane, the fetus is at a greater risk for the development of infection and preterm delivery. The fetus is also at risk for becoming septic after delivery. Additionally, without the cushioning of the amniotic fluid, there is a higher probability of umbilical cord compression as well as cord prolapse.

Patients with PPROM or PROM have a risk of developing chorioamnionitis (infection of the chorion and amnion of the placenta), which can be life-threatening for the patient and fetus.

**Medical Treatment**

The first step in determining the appropriate course of action for patients with possible PROM or PPROM involves distinguishing amniotic fluid from urine or other vaginal discharge. Often patients complain of a “sudden gush” and/or a continuous or intermittent trickle of fluid from the vagina once the membranes have actually ruptured. The healthcare practitioner will perform a sterile speculum examination to look for pooling of amniotic fluid near the cervix.

Fluid may be tested using nitrazine paper as well as via microscopic examination for the presence of ferning (the appearance of a fernlike pattern in a dried specimen of cervical mucus or vaginal fluid, which would indicate the presence of amniotic fluid). Commercial tests, such as AmniSure, may also be used to test for ruptured membranes. Ultrasound examination may be performed to determine the amount of available amniotic fluid after the rupture of membranes.

Medical treatment for patients with PROM or PPROM depends on a variety of factors. Gestational age, fetal lung maturity, available amniotic fluid, and etiology must be considered before deciding on treatment. Patients near term whose labor does not begin spontaneously following the rupture of membranes may be induced if the cervix is ripe. For preterm patients, healthcare practitioners and patients may desire to prolong the pregnancy to promote fetal lung maturity; such patients may be prescribed corticosteroids to promote fetal lung maturity until delivery occurs or until there is a need to induce labor.

The cause of early rupture of membranes as well as the degree of amniotic fluid loss must also be considered when determining the appropriate course of action for patients with PPROM. Antibiotics are often administered to treat any infection and to prevent chorioamnionitis. If there is a significant loss of amniotic fluid rather than a slow leak, there is a stronger possibility of the need to induce labor. However, in preterm gestation, an amniotic sac with a slow leak of amniotic fluid may rarely form a seal, and the amniotic fluid may reestablish itself (Duff, 2019).
**Nursing Care**

As with medical treatment, nursing care greatly depends on whether the medical diagnosis is PPROM or PROM. However, nursing care typically involves assisting the healthcare practitioner to confirm the rupture of membranes, monitoring the patient for infection and the presence of uterine contractions, and monitoring the status of the fetus. It is imperative that the nurse change patient underpads frequently and avoid unnecessary vaginal examinations to prevent infection (and with PPROM to avoid decreasing the time until delivery) (Duff, 2019).

Nursing care for patients whose labor is induced involves administering induction agents and monitoring the status of the patient, fetus, and uterine contractions. As with all complications in pregnancy, the nurse should be available to answer questions and assist in relieving the patient’s anxiety about her diagnosis.

When dealing with PPROM and PROM, the nurse should be prepared to address cord prolapse and compression, which can occur as the umbilical cord slips down in the pelvis. This is a life-threatening situation for the fetus; therefore, the fetus must be monitored closely. In the event of cord prolapse and compression, the nurse attempts to relieve pressure on the umbilical cord and instructs the patient to quickly move into the knee-chest or Trendelenburg positions. Oxygen is administered and the healthcare practitioner notified immediately. Emergency cesarean section is likely.

**Patient Teaching**

It is important for patients with PPROM to understand the signs and symptoms that suggest infection as well as preterm labor, which often follows PPROM. The patient should be watched for any of the following signs and symptoms:

- Fever >100.4 °F (>38 °C)
- Foul-smelling vaginal discharge or other signs of infection
- Uterine contractions or cramping (including tightening of the abdomen)
- Decreased fetal movement

In addition, patients are encouraged to avoid activities or objects that might induce labor or cause infection by exposing the cervix to bacteria. These include sexual activity, orgasm, nipple stimulation, tampons, and douches. Some patients may be placed on bed rest and should be encouraged to follow this directive to prevent preterm labor.

**CASE**

Neema, a 26-year-old in the 30th week of her second pregnancy, has come to the clinic for an additional prenatal visit. She states, “I came in because I’m not sure what’s going on down there. It feels like I’m peeing on myself, but I don’t think I am.” A small amount of clear liquid is noted on Neema’s peri-pad. She continues, “It all started yesterday morning, and when I told my husband, he said I should stay home from work, relax, and take a nice hot bath.”
A sterile speculum was used to sample the fluid pooled near the cervix. When tested using nitrazine paper and examined microscopically, the fluid is alkalotic and shows ferning. The AmniSure test is positive. Neema is not experiencing any cramping or uterine contractions. Fetal heart tones are strong and regular, and all of Neema’s vital signs are within normal limits. Neema asks, “Does this mean I will have a dry labor?”

**Discussion**

Neema has preterm prelabor rupture of membranes (PPROM). Neema’s nurse will monitor Neema’s temperature and report a reading higher than 100.4 °F (38 °C). The nurse will also question Neema about uterine tenderness and uterine contractions and note offensive-smelling vaginal discharge. Neema should avoid activities or objects that might bring about labor or cause infection. She will be told to avoid taking baths. Neema should be informed that because amniotic fluid is constantly being formed, she will not experience a dry labor. Neema’s healthcare practitioner may put her on bed rest with bathroom privileges.

(Case study courtesy of Sharon Walker, RN, MSN.)

### PRETERM LABOR AND BIRTH

Preterm labor refers to labor that occurs after 20 weeks’ but before 37 weeks’ gestation. Preterm birth, a consequence of preterm labor, refers to delivery prior to 37 weeks’ gestation.

#### Incidence and Risk Factors

Preterm labor is responsible for preterm birth, which affects the ability of the newborn to adjust to extrauterine life. According to the CDC (2019), the preterm birth rate in the United States in 2017 was 10%. Preterm birth is a significant contributor to infant mortality rates. A variety of risk factors predispose patients to preterm labor and subsequent birth:

- **Prior OB/GYN history**
  - Prior preterm birth
  - Prior cervical surgery (e.g., cone biopsy, loop electrosurgical excision procedure [LEEP])
  - Multiple dilations and evacuations (D&Es)
  - Uterine anomalies
- **Maternal demographics**
  - <17 or >35 years of age
  - Lower educational level (e.g., <12th grade)
  - Single marital status
  - Lower socioeconomic status
  - Short interpregnancy interval (e.g., <6 months)
Other social factors (e.g., poor access to medical care, physical abuse, acculturation)

Nutritional status/physical activity
- Body mass index (BMI) <19 kg/m² or prepregnancy weight <50 kg (<120 lb.)
- Poor nutritional status
- Long working hours (e.g., >80 hours/week)
- Hard physical labor (e.g., shift work, standing >8 hours)

Current maternal/pregnancy characteristics
- Conception by assisted reproductive techniques (e.g., in vitro fertilization [IVF])
- Multiple gestation
- Fetal disorder (e.g., chromosome anomaly, structural abnormality, growth restriction, death, etc.)
- Vaginal bleeding (e.g., 1st and 2nd trimester, placenta previa, abruption)
- Poly- or oligohydramnios
- Maternal medical conditions (e.g., hypertension, diabetes, thyroid disease, asthma, etc.)
- Maternal abdominal surgery during pregnancy
- Psychological issues (e.g., stress, depression)
- Adverse behaviors (e.g., smoking, heavy alcohol consumption, cocaine use, heroin use)

Infection (e.g., bacterial vaginosis, trichomoniasis, chlamydia, gonorrhea, syphilis, urinary tract, severe viral infection, intrauterine infection)

Short cervical length between 14 and 28 weeks
Positive fetal fibronectin testing between 22 and 34 weeks
Uterine contractions
(Robinson & Norwitz, 2019)

Maternal and Fetal Implications

Preterm labor and birth present a unique challenge to patients and their fetuses. Although most of the implications apply to the fetus, patients may suffer from stress due to the diagnosis of preterm labor and birth as well as from the causative agent. Specifically, patients may be experiencing preterm labor and birth due to conditions such as sepsis or stress.

The fetus is at great risk for delivering early as a result of preterm labor. The effects of preterm labor and birth depend on the gestational age of the fetus at delivery. However, the immaturity of fetal lungs in the presence of preterm labor and birth is a significant concern.
Signs and Symptoms

Patients presenting with preterm labor and birth often complain of feeling pressure in the pelvic area, abdominal and/or uterine cramping or contractions, painful or painless contractions, feeling as though the fetus is “balling up,” and/or constant back pain. Amniotic membranes may rupture prematurely, and a sudden gush or constant trickle of vaginal fluid may be noted.

Medical Treatment

Clinical criteria for a diagnosis of preterm labor include:

- Persistent uterine contractions (4 every 20 minutes or 8 every 60 minutes) and
- Cervical dilation ≥3 cm or cervical length <20 mm on transvaginal ultrasound or
- Cervical length 20 to <30 mm on transvaginal ultrasound and positive fetal fibronectin (Lockwood, 2019)

Medical treatment for preterm labor and birth is dependent on the gestational age of the fetus. Generally, healthcare practitioners seek to avoid delivery of patients prior to 34 weeks’ gestation to allow further maturation of the fetal lungs. They often prescribe glucocorticoids (betamethasone) to increase fetal lung maturity, tocolytics to control uterine contractions, antibiotics for group B streptococcal chemoprophylaxis, and magnesium sulfate for neuroprotection in offspring born preterm (Lockwood, 2019).

Nursing Care

Nursing care for patients experiencing preterm labor includes administering prescribed medications such as antibiotics, glucocorticoids, magnesium sulfate, and tocolytics and preparing the patient for possible delivery. While hospitalized, patients are monitored for signs and symptoms of infection, which can lead to preterm labor. Fetal tachycardia indicates possible infection and should be evaluated immediately. Vital signs, contractions, and fetal status are assessed as ordered or according to institutional policy.

When patients are faced with the possibility of delivering a preterm infant, the situation may quickly become overwhelming to them. Although preterm labor and birth can occur rapidly, it is imperative that nurses address the emotional issues of the patient. Generally, this will involve answering patient questions about the status of the fetus and preparing the patient for the care required to prevent delivery or the necessary preparation for preterm delivery.

Patient Teaching

The major goal of teaching patients with preterm labor is to help them become aware of factors that may cause premature labor and delivery. If the acute episode of preterm labor has passed, patients may be discharged and should be taught to:
• Continue activities of daily living but do not lift anything >20 pounds and avoid recreational exercise
• Avoid sexual activity, since orgasm and prostaglandins in semen can increase myometrial activity
• Avoid returning to work if it involves more than 40 hours/week, night shifts, prolonged standing, or heavy physical work (Caritis & Simhan, 2019)
• Rest in the left side-lying position to improve blood flow to the uterus
• Consume adequate fluids to prevent dehydration, which causes the release of oxytocin
• Notify their healthcare practitioner immediately if any of the following signs and symptoms are noted:
  o Uterine contractions
  o Cramping or irritability
  o Constant back pain
  o A feeling that the fetus is “balling up”
  o A gush or a constant trickle of vaginal fluid
  o Fever

### POST-TERM PREGNANCY
Just as preterm delivery comes with complications, a post-term delivery can lead to complications as well. A post-term pregnancy is defined as 42 or more weeks’ gestation. Due to placental insufficiency or excessive fetal growth, maternal, fetal, and neonatal complications can occur. These include macrosomia (and possible associated surgical delivery or birth injury), intrauterine malnutrition, and perinatal mortality. It is recommended to induce at 41 weeks’ gestation in order to decrease the likelihood of complications.

### CASE
Ciara phones the perinatal clinic. She is 18 years old and in the 32nd week of her second pregnancy. Ciara’s first child was born at 36 weeks’ gestation.

Ciara is sobbing over the phone and keeps repeating, “I don’t want it to happen again.” The nurse asks Ciara to take a deep breath, sit down, and explain how she is feeling. After a short time, Ciara states that she is having uterine contractions that are occurring every 10 minutes and lasting for 1 to 2 minutes. The contractions started about three hours ago and did not stop when she tried to walk. Asked about a gush of water from the vagina, she denies it. Ciara says, “I still feel the baby kicking. That’s a good thing, isn’t it? Did I make this happen?”

After reviewing her patient record, the nurse discovers that there is a history of social service intervention. As a result of Ciara’s impoverished circumstances, Ciara and her 3-year-old child
receive nutritional support through the WIC (Women, Infants, and Children) program and live in a shelter to escape from an abusive cohabiting male.

Ciara is told to have someone bring her to the hospital as soon as possible. She states that she already called for a ride and that she should be arriving at the hospital within 30 minutes. The nurse tells Ciara to lie down on her left side, drink plenty of fluids, and wait for her ride.

**Discussion**

Ciara may be in preterm labor. She has several risk factors, including low socioeconomic status, significant life events (separation), anxiety, a history of preterm labor and birth, and poor nutrition. Ciara will be assessed for the condition of her cervix and amniotic membranes upon arriving at the hospital. Vital signs, contractions, and fetal status will be evaluated. She will also be observed for signs of infection and dehydration. She is very anxious, and because she has had a previous preterm birth, Ciara may have feelings of guilt that require reassurance and psychological support. The goal of her hospitalization would be to avoid delivery.

*(Case study courtesy of Sharon Walker, RN, MSN.)*

**CONCLUSION**

Pregnancy, labor, and birth are a wondrous time in the lives of countless women and their families. However, this time can be clouded by a variety of complications that affect the patient and fetus. Fortunately, with early identification and treatment of complications and their side effects, patients and their infants have a greater chance of survival and the potential to thrive after delivery.

Nurses play a special role in ensuring the safety of the patient and her unborn child during all phases of pregnancy and delivery. They must be knowledgeable about complications that can occur during pregnancy and ready to act on behalf of the patient and her unborn child. This is the responsibility and goal of the perinatal nurse.

Most hospitals and birthing centers provide evidence-based guidelines for nurses caring for female patients experiencing complications during their pregnancies. Nurses must provide comprehensive care that follows the recommendations of their facilities.

**RESOURCES**

American Society of Reproductive Medicine
http://www.asrm.org

Association of Women’s Health, Obstetric, and Neonatal Nurses
https://www.awhonn.org
Gestational diabetes (American Diabetes Association)
https://www.diabetes.org/diabetes/gestational-diabetes

Gestational trophoblastic disease (American Cancer Society)

Hyperemesis education and research (HER Foundation)
https://www.helpher.org

REFERENCES

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1. Spontaneous abortion or miscarriage can be described as the loss of pregnancy:
   a. At less than 20 weeks gestation.
   b. At fetal size less than 600 grams.
   c. With healthcare provider intervention.
   d. Without vaginal bleeding.

2. Which is a common symptom of hemorrhagic shock?
   a. Hot, dry, and flushed skin
   b. Increased heart rate
   c. Increased blood pressure
   d. Smoky or cloudy urine

3. The perinatal nurse who is caring for a patient admitted with pregnancy loss is aware that:
   a. Routine daily activities cause pregnancy loss.
   b. Grief generally occurs only when the loss is in the third trimester.
   c. Patients with threatened abortions do not need RhoGAM.
   d. Significant emotional challenges are likely to arise.

4. The major physiologic mechanism of disseminated intravascular coagulation (DIC) is:
   a. Overactivation of the blood-clotting process.
   b. Decreased glomerular filtration.
   c. Amniotic fluid forced into the maternal circulation.
   d. An elevation of liver enzymes.

5. How does the nurse instruct a patient who is discharged after a pregnancy loss?
   a. “Try having another baby as soon as possible.”
   b. “Decrease fluid intake to decrease the bleeding.”
   c. “Take your iron supplements and/or antibiotics as directed.”
   d. “Douche every other day for at least two weeks.”
6. Which prenatal condition is a risk factor for an ectopic pregnancy?
   a. Pelvic genital infection
   b. Multiparity
   c. Twin gestation
   d. History of heavy menstrual periods

7. A female patient who is admitted for an ectopic pregnancy and treated with methotrexate requires:
   a. Guidelines about immediately increasing her exercise level.
   b. Co-treatment with nonsteroidal anti-inflammatory drugs (NSAIDs).
   c. Instructions to avoid alcohol and foods and vitamins containing folic acid.
   d. Encouragement to reduce the intake of fast foods that are high in fat.

8. At a female patient’s 20-week prenatal visit, gestational trophoblastic disease (GTD) might be suspected upon assessment of which patient finding?
   a. A decreased serum hCG level
   b. A fetal heart tone that is much faster than expected
   c. A uterus that is larger than expected for gestational age
   d. A blood pressure of 120/80 mmHg with weight gain

9. After a molar pregnancy, the female patient is instructed to undergo regular physical examinations throughout the following year to assess for possible:
   a. Choriocarcinoma.
   b. Hypertension.
   c. Hypoglycemia.
   d. Infection.

10. Which antenatal intervention is contraindicated for a patient with a suspected placenta previa?
    a. External fetal monitoring
    b. Determination of fetal lie
    c. Vaginal examination
    d. Nonstress testing to evaluate fetal status
11. Which physical examination finding is predictive of placental abruption?
   a. Excessive fetal movement
   b. A board-like abdomen
   c. Foul-smelling vaginal discharge
   d. A decreased maternal heart rate

12. Which maternal symptom best distinguishes placenta previa from placental abruption?
   a. Tachypnea
   b. Painless, bright-red vaginal bleeding
   c. Ruptured membranes
   d. Confusion and disorientation

13. The nursing care for a patient with hyperemesis gravidarum is based on which knowledge?
   a. The condition is always psychological.
   b. The possible outcomes are dehydration and starvation.
   c. The clinical symptoms are the same as the nausea and vomiting of early pregnancy.
   d. The impact on the fetus is negligible.

14. A classic symptom of preeclampsia is:
   a. Hematuria.
   b. Urinary tract infections.
   c. Proteinuria.
   d. Glucosuria.

15. The only known cure for gestational hypertension is:
   a. Antihypertensive medication.
   b. Anticonvulsant medication.
   c. Glucocorticoid administration.
   d. Delivery of the baby.

16. The nurse caring for the female patient who is pregnant and hospitalized for gestational hypertension carefully monitors the patient for increased headache, epigastric pain, and:
   a. Ear pain.
   b. Body aches.
   c. Rash.
   d. Visual disturbances.
17. A female patient who is pregnant develops preeclampsia and is hospitalized for IV infusion of magnesium sulfate (MgSO₄). Which nursing assessment indicates a potentially toxic level of MgSO₄?
   a. A urinary output of 45 ml/hour
   b. Petechiae
   c. Increased bleeding
   d. A respiratory rate of 8 breaths per minute

18. When the threat of eclampsia develops in a female patient who is pregnant, which equipment does the nurse have ready at the bedside to prevent injury after potential seizure activity?
   a. An assistive defibrillator
   b. A lumbar puncture tray
   c. A nonrebreather mask and oxygen therapy
   d. A tracheostomy set and a ventilator

19. Which is a risk factor for gestational diabetes mellitus?
   a. A family history of diabetes mellitus
   b. A young maternal age
   c. The presence of proteinuria
   d. An underweight status before pregnancy

20. Which significant complication is carefully monitored in the newborn infant who is born to a female patient with gestational diabetes?
   a. Hypercalcemia
   b. Hypobilirubinemia
   c. Hypoglycemia
   d. Hypervolemia

21. Which intervention reduces complications in the female patient with gestational diabetes?
   a. Prompt administration of insulin to the newborn after delivery
   b. Self-administration of glucose cola every morning during pregnancy
   c. Close monitoring of glucose at home during pregnancy
   d. Restricting caloric intake to prevent fetal macrosomia during pregnancy
22. A risk factor for preterm prelabor rupture of membranes (PPROM) is:
   a. Cigarette smoking.
   b. A head-down fetal presentation.
   c. A maternal high-fat diet.
   d. Sedentary work.

23. Glucocorticoids are administered to a female patient who is experiencing preterm labor in order to:
   a. Stop labor and birth.
   b. Treat infection.
   c. Increase fetal lung maturity.
   d. Alleviate maternal anxiety.

24. A patient with preterm labor asks the nurse why she needs to rest in the left side-lying position. The nurse responds that this position:
   a. “Gives your baby more space to move.”
   b. “Improves blood flow to your uterus.”
   c. “Takes pressure off of your back.”
   d. “Will help you feel more comfortable during contractions.”