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Abstract

It is estimated that 750,000 to 1,000,000 miscarriages occur every year in the United States. Women experiencing a miscarriage enter the healthcare system in a variety of ways. A family may be seen for a miscarriage in the prenatal clinic, the emergency department, same-day surgical department, or perhaps the labor and birth unit. Nurses must be prepared to guide and support these families. Understanding the clinical aspects of miscarriage as well as the emotional care of families experiencing early pregnancy loss is important to nurses in all areas of the medical center. Clinical aspects of miscarriage are reviewed along with the needed emotional care for families experiencing the most common cause of early pregnancy loss.

Key words: Attitudes of healthcare personnel; Diagnosis of miscarriage; Miscarriage; Misoprostol.

CLINICAL ASPECTS OF MISCARRIAGE

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Many view miscarriage as a fact of life; less concerning and less important than other losses, such as stillbirth or newborn death. Yet miscarriage may have significant and long-lasting emotional impact (Engel & Rempel, 2016; Limbo & Kobler, 2010; Limbo & Wheeler, 1986–2003; Murphy & Merrell, 2009; Rowlands & Lee, 2010), as obstetrician gynecologist Dr. Mary Alvarado describes in Box 1. Her personal story conveys the significant effect pregnancy loss may have. It is estimated that there are 750,000 to 1,000,000 miscarriages every year in the United States (Bardos, Hercz, Friedenthal, Missmer, & Williams, 2015), about 80% of which occur in the first trimester (American College of Obstetricians and Gynecologists [ACOG], 2015). Risk of miscarriage increases exponentially with age, especially for women aged ≥ 40 years (ACOG & American Society for Reproductive Medicine [ASRM], 2014). Miscarriage is defined by ACOG (2015) as an intrauterine pregnancy (IUP) with a gestational sac or embryo/fetus, thus ectopic pregnancy and complete molar pregnancy will not be included in our discussion. Table 1 contains definitions for the various types of miscarriage.

Miscarriage is
the most common
cause of early
pregnancy loss.

Terminology

Abortion has been used as a clinical term to describe not only an elective procedure performed to end a pregnancy, but also a spontaneous loss; however, a stigma is associated with the word *abortion*. In lay terms, abortion typically connotes the elective procedure, so using it to describe a spontaneous loss is confusing and inappropriate to women undergoing such a loss. To properly distinguish elective from spontaneous pregnancy loss, a number of professional societies, including ACOG, ASRM, and the Royal College of Obstetricians and Gynaecologists (RCOG), have adopted the term *miscarriage* to refer to spontaneous pregnancy loss.

Understanding Potential Causes

Researchers report many potential causes of miscarriage (Table 2). The most common cause of spontaneous miscarriage is embryonic/fetal chromosomal abnormality. To determine whether chromosomal abnormality was present, genetic testing of products of conception can be offered as part of miscarriage evaluation. Most chromosomal abnormalities arise de novo rather than being

inherited from a parent with a balanced translocation (ASRM, 2012), so it is not necessarily likely to occur again. Some genetic abnormalities are not easily detected by conventional analysis because they are caused by point mutations, microdeletions, or duplications. Congenital anomalies can also be caused by extrinsic factors, such as amniotic bands; exposure to teratogens, such as maternal drug use; metabolic derangements related to maternal disease, such as poorly controlled diabetes or infection; and exposure to environmental factors, such as mercury or lead (Neuman, Gareri, & Koren, 2014). During early pregnancy, the uterus is remarkably well protected from blunt trauma to the maternal abdomen; therefore, trauma does not represent a significant risk for miscarriage. Invasive procedures such as chorionic villus sampling and amniocentesis, however, have been linked to miscarriage. With the advent of maternal serum analyte and cell-free DNA testing, these procedures are performed less frequently, but direct evaluation of fetal chromosomes can be invaluable.

Diagnosis

Detection of the beta subunit of the hormone human chorionic gonadotropin (β -hCG) is the basis of all pregnancy tests. It is secreted into the maternal circulation after implantation, which typically occurs 6 to 12 days after ovulation. The concentration of β -hCG typically doubles or nearly doubles every 48 hours. A single test for β -hCG cannot establish exact gestation, but the change in β -hCG over time can help to determine whether a pregnancy is viable. The discriminatory zone for β -hCG is the serum level above which a gestational sac should be visualized by ultrasonography if an IUP is present. Although evidence of a developing IUP can be visualized at relatively low β -hCG concentrations ($<1,000$ mIU/mL), setting a threshold for visualization of a definitive IUP has proven to be somewhat difficult. Despite earlier studies that suggested the threshold as low as 2,000 IU/L, Doubilet et al. (2013) found that a 99% predicted probability of visualization of a gestational sac was at a β -hCG concentration of 3,510 IU/L.

For diagnosis of miscarriage, the woman may need to undergo a blood test to measure the concentration of β -hCG, an internal pelvic examination to determine whether her cervix is dilated or effaced (a sign of possible miscarriage), or, depending on the length of time since her last menstrual period and the serum β -hCG value, she may need an ultrasonographic study, through which her healthcare provider can observe the pregnancy and the maternal reproductive organs, such as the uterus and placenta (Snell, 2009). If a woman has had more than one miscarriage, she may choose to have blood drawn and analyzed for chromosomal abnormalities, hormonal irregularities, or immune system disorders that may interfere with a healthy pregnancy (Branch, Gibson, & Silver, 2010).



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Table 1. Miscarriage Definitions

Miscarriage Type	Definition
Threatened	Bleeding in pregnancy prior to 20 weeks gestation
Missed	A pregnancy loss diagnosed prior to 14 weeks of pregnancy without symptoms of bleeding or passage of tissue
Inevitable	The cervical os is open and typically accompanied by bleeding without passage of pregnancy tissue
Incomplete	The cervical os is open, accompanied by bleeding and passage of tissue, along with additional intrauterine tissue remaining
Complete	The cervical os has closed following passage of all apparent gestational tissue
Anembryonic gestation	Evidence of an intrauterine gestational sac without evidence of yolk sac or fetal pole
Septic	Partial passage of intrauterine contents occurred and is accompanied by evidence of infection, including fever, uterine tenderness, and elevated white blood cell count

Guidance on normal pregnancy milestones is key in determining whether what is seen by ultrasonography represents a normal or abnormal pregnancy. Based on criteria from the American College of Radiology (2012) and RCOG (2012), the established criteria for diagnosis of miscarriage on pelvic ultrasonogram are (a) a gestational sac ≥ 25 mm in mean diameter that does not contain a yolk sac or embryo, or (b) an embryo with a crown rump length (CRL) ≥ 7 mm that does not have cardiac activity. If the gestational sac or embryo is smaller than these dimensions,

a repeat pelvic ultrasonogram is recommended 1 to 2 weeks later to assess for interval change.

For pregnancies that do not meet the size criteria above, the Society of Radiologists in Ultrasound (Doubilet et al., 2013) added additional criteria in 2013 for diagnosis of an unsuccessful pregnancy based on lack of development of structures over time. If a pelvic ultrasonogram reveals a gestational sac without a yolk sac, the absence of an embryo with a heartbeat in ≥ 2 weeks indicates a miscarriage. A pelvic ultrasonogram showing a gestational sac with a yolk sac but the absence of an embryo with a heartbeat at ≥ 11 days suggests an abnormal gestation/pregnancy loss. In cases where an ultrasonogram shows a CRL of < 7 mm and no heartbeat, follow-up is not as well established; however, repeating the ultrasonographic study in 1 to 2 weeks is believed to be reasonable. If there is no heartbeat or fetal pole growth in that time, miscarriage is assumed (ACOG, 2015).

Table 2. Potential Causes of Miscarriage

Cause	Risk, %
Aging ovum (ACOG & ASRM, 2014)	
Woman's age, y	
20–30	9–17
35	20
40	40
45	80
Irregular ovulation and luteal phase defects (Wilding, 2015)	
Prior miscarriage (Bhattacharya, Townend, & Bhattacharya, 2010)	
After one miscarriage	14
After two miscarriages	26
After three miscarriages	28
Maternal social factors	
Cigarette smoking (Hyland et al., 2015)	
Alcohol consumption (Bingham, 2015)	
Illicit drug use (Edelman, Patel, Glasper, & Bogen-Johnston, 2014)	
Other factors	
Maternal caffeine use, dose-related (Savitz, Chan, Hering, Howards, & Hartmann, 2008)	
Uterine anomalies, both acquired and congenital: müllerian defects, adhesions from curettage or septum removal, and scarring from prior myomectomy, fibroid removal, or classical cesarean section (ASRM, 2012)	
Maternal infections: rubella, toxoplasmosis, herpes simplex virus, cytomegalovirus, parvovirus, listeria (Jamieson, Kourtis, Bell, & Rasmussen, 2006), and Zika (van der Eijk et al., 2016)	
Endocrinopathies: thyroid dysfunction (ASRM) and polycystic ovary syndrome (Yu, Chen, Rao, & Gong, 2016)	
Maternal diabetes, especially if not well controlled (ASRM)	
Thrombophilias: factor V Leiden deficiency and methylene tetrahydrofolate reductase (ASRM)	
Maternal immune disorders: lupus erythematosus (Gleicher, Weghofer, & Barad, 2012) and antiphospholipid antibody syndrome (ASRM)	
Embryonic/fetal chromosomal abnormality is the causative factor in 50% to 60% of all miscarriages (Romero et al., 2015)	

Symptoms

Symptoms of miscarriage may include vaginal spotting or bleeding, abdominal pain or cramps, low back pain, and fluid, tissue, or clot-like material passing from the vagina. Although vaginal bleeding is a common symptom of miscarriage, many women have spotting early in their pregnancy but do not miscarry. Pregnant women who have any of the symptoms of miscarriage should contact their healthcare providers immediately (Promes & Nobay, 2010). Women who miscarry are often unprepared for the intensity of the pain they will experience and for the amount of bleeding they will have and how to quantify it (Radford & Hughes, 2015). Without appropriate education, women might be unsure of what to do in this situation and may go to the emergency department (ED) or antenatal clinic unannounced. Nurses are critical in this process of preparing women for the progression from early symptoms to the actual miscarriage. Attending to details such as the amount of pain to expect and the number of heavy menstrual pads she might saturate in what period of time gives her information that can prevent unnecessary ED visits. Based on the woman's anxiety level and pain tolerance, a nurse can suggest pain management techniques, such as over-the-counter pain relief medications in specific milligram amounts, hot baths or showers, hot towels or heating pads, and essential oils, such as clove, cypress, lavender, or citrus (Singh & Chaturvedi, 2015).

Treatment Options

Clinical stability, the woman's preference, and estimated gestational age of the conceptus should be considered when deciding the appropriate course of treatment. In the presence of maternal hemodynamic instability and/or uncontrolled heavy bleeding, suction dilation and curettage (D&C) remains standard of care; however, if there is time to consider alternate therapies, patients must be included in decision making. Until about 2005, expectant management and surgical intervention with D&C were the primary options for a woman having a pregnancy loss. Discovery of the side effects of misoprostol was serendipitous for those who could benefit from its therapy. In 2000, misoprostol was ap-



Only 6% of registered nurses feel prepared to provide care for women experiencing a miscarriage.

Box 1.

Exemplar Case: My Experience with Miscarriage

I had some spotting on Friday but when it became heavier, I called for advice and was told to go to urgent care. A nurse bombarded me with questions and told me how few staff were available on the weekend. I was alone because my husband was at work, but I thought it would all be ok. In time, I was taken to the ultrasound suite. The room was dark, and I remember thinking how much I wanted to see my baby and its heartbeat. I was asked to undress from the waist down and told that the ultrasound would be done vaginally. The sonographer was male, so I was asked to place the probe, which was awkward. Other than directing me to the end of the table, he said little. A doctor came in. Instead of reassuring me, she said to the sonographer, "There's nothing there, we are done," and walked out. I dressed and went to a waiting area. The doctor again appeared and said she was unable to talk with me about "everything," but another provider would be there shortly. After 20 minutes or so, another physician appeared. She seemed kind and said she was sorry that I had "to go through something like this." I then realized I would never see my baby, and I started to cry. I wished my husband was there. The next day I had a D&C. That was over 20 years ago. I was in medical school, and I swore I would never treat a patient the way I had been treated initially. I now have five beautiful children, and experienced one more loss along the way. I am now an OB/GYN physician and have cared for many couples in similar situations. Miscarriage is common; but I know that the experience is far from common to those who experience it.

proved by the U.S. Food and Drug Administration for use in inducing miscarriage when used in combination with mifepristone. As early as 2005, studies demonstrated the effectiveness of misoprostol alone for emptying the uterus of products of conception, although its use as a single agent for miscarriage induction remains off-label.

A landmark study by Zhang et al. (2005) reported that up to 71% of women had complete expulsion of products of conception with one dose of misoprostol; that rose to 84% with a second dose. Suction D&C was needed in up to 16% of women in the misoprostol group. Of those women undergoing D&C, 90% had complete clearing of uterine contents by day 15, and 97% by day 30. A repeat D&C was needed in only 3% of women. Rates of complications, such as fever, infection, excessive bleeding, and ED visits were very low and quite similar to those of women treated with misoprostol and D&C. Surgical complications related to injury to pelvic organs applied only to the D&C group, but women in the misoprostol group had nearly twice the incidence of nausea, vomiting, and diarrhea. These side effects were considered "tolerable," and almost 85% of women in the misoprostol group reported that they would recommend treatment to others. Currently, no research has evaluated efficacy of misoprostol in the outpatient setting for treatment of miscarriages over 13 weeks gestation.

Maternal blood type and rhesus D (RhD) status need to be clearly documented, and Rho(D) immune globulin must be administered to all RhD-negative, unsensitized patients. The red cell mass of the first-trimester fetus is small, so the dose necessary for first-trimester events is 50 µg. This should be administered immediately after surgical intervention or within 72 hours of miscarriage diagnosis (ACOG, 2016).

Professionals working in outpatient and inpatient obstetric or family medicine departments and in the ED will be called upon to care for women experiencing miscar-

riage. Using Swanson's theory of caring, Gergett and Gillen (2014) interviewed healthcare professionals from midwifery, nursing, and medicine. Participants reported insufficient understanding and preparation regarding miscarriage, as well as personally held assumptions that miscarriage has few physical or psychological consequences as potential barriers to care. Healthcare providers with minimal clinical expertise and/or who see miscarriage as low risk may find themselves ill-prepared to respond to complications, treatment plans with unexpected consequences, and the deeply felt emotions that may accompany miscarriage. Engel and Rempel (2016) found that only 42% of healthcare professionals felt prepared to support these families. Of all professionals, registered nurses felt least prepared, with only 6% feeling ready to provide appropriate care. Education and training can enhance sensitivity to the significance of pregnancy loss. Gergett and Gillen noted that healthcare professionals who attended a bereavement training program felt better prepared to attend to the emotional needs of families experiencing miscarriage. Personal experience, too, often leads to a clearer understanding of the experience. After her own loss, Mary Alvarado (Box 1) promised herself she would treat women experiencing miscarriage with compassion.

Limbo, Glasser, and Sundaram (2014) identified "being sure" as a central theme for women in the process of making

Clinical Nursing Implications

- Understand the risks for, and causes of, miscarriage.
- Assess the meaning of miscarriage for the woman and her family.
- Provide clinical information and assist the woman in “being sure” that her pregnancy has ended.
- Understand the three treatment options for management of miscarriage.
- Assist the woman in the decision-making process as she chooses the option that is right for her.
- Be prepared to explain the three treatment options and potential side effects.

decisions about what was happening to them and about the treatment options available. Being sure included reassurance that the pregnancy was truly over, that a miscarriage was occurring, and that they were choosing the treatment option that was right for them. Nursing assessment and support as women make decisions about treatment choices is critical. Nurses must be familiar with the options available for completing the miscarriage and be prepared to guide women in the decision-making process. To make a truly informed decision, a woman likely will want to know details about each option available to her. With a wait-and-see plan, she will need to know the average wait time before the miscarriage will be completed, what kinds of symptoms she might experience, and pain management strategies. Parameters should be given for bleeding and expected pain. Guidelines for bleeding should include the point at which bleeding is such that she might need to go to the healthcare facility, and what to do with any tissue or products of conception. If she decides to use misoprostol, a full review of medication administration and of the medication’s potential side effects and their management is necessary. Finally, if she chooses a D&C, she will need information about the medications used for sedation, the sights and sounds she can expect during the procedure, and the usual course of recovery from the procedure.

Women have many concerns about miscarriage (Limbo et al., 2014). Women need nurses, midwives, and physicians who will help them in this process and will understand what their trepidations are in choosing the best treatment. If a woman chooses expectant management or misoprostol, the loss may occur outside the healthcare setting. The woman should be made aware of the options for respectful disposition and for genetic testing. She should be provided with information on where to bring the baby or

products of conception should she choose to do genetic testing or have the hospital handle the disposition.

Perspectives of Women

There is a gap between what a woman and her family might need when experiencing a miscarriage and what healthcare professionals actually provide (Gergett & Gillen, 2014). Across interviewees, miscarriage was described similarly, most commonly as a “devastating” event for women and their families, and as one of the most emotional medical events treated at facilities. The emotional nature of miscarriage care was also noted during observations (Dennis, Fuentes, Douglas-Durham, & Grossman, 2015). Huffman, Schwartz, and Swanson (2015) confirmed that men report significantly less emotional impact from miscarriage. Healthcare providers, aware of potential incongruencies in the parents’ grief process, need to assess both partners and provide follow-up appropriate to their individual grieving processes.

The physical aspects of the nursing care of women experiencing miscarriage are often uneventful and without unusual complications. Nurses may consider miscarriage as a relatively minor and commonplace pregnancy complication (Murphy & Merrell, 2009). Limbo et al. (2014) defined miscarriage as a unique experience for women and their families, but Rowlands and Lee (2010) found that some women are treated with a lack of empathy; with no attendance to privacy issues, low priority to miscarriage in emergency situations, long wait times for evaluation and diagnosis, and avoidance of discussion of the loss. In part, this may be attributed to a lack of understanding of miscarriage and insufficient preparation to care for women experi-



Healthcare workers need to continue to strive to understand the meaning of miscarriage for the woman and her family.

encing miscarriage, as well as to assumptions that miscarriage has few psychological or physical consequences (Gergett & Gillen, 2014). Engel and Rempel (2016) found that clinicians are generally concerned about providing care for women and their families experiencing a miscarriage. They believe that miscarriage can have a significant impact on women and their families, but they also concluded that healthcare professionals' attitudes, beliefs, and behaviors, as well as system barriers, limit access to care.

Clinical Implications

Healthcare professionals should seek to understand the meaning of miscarriage for the woman and her family (Murphy & Merrell, 2009). Pursuing educational opportunities to learn more about miscarriage, the processes involved, the options, and the decisions families need to make will prepare clinicians to guide and support these families. Bardos et al. (2015) found that only 45% of participants who experienced miscarriage felt that they had received adequate emotional support. Miscarriage-sensitive processes at a system level, as well as the availability of resources, will complement the care that professionals give (Engel & Rempel, 2016). Providing the same standard of care for miscarriage, no matter where the woman enters the healthcare system, is one example of consistency of care. Another example is staff education, consistent across units and designed to promote concepts such as cocreating keepsakes, explaining signs and symptoms of complications after discharge, and informing women of respectful disposition options. Although many women view miscarriage as a loss of their baby and the loss of their hopes and dreams, few physical markers of that relationship remain (Gergett & Gillen, 2014). Offering mementos, a baby ring, handprint or footprint molds, a handmade blanket, honors the parent-child relationship. Although not always possible, these items serve as a tangible expression of the family's loss.

"Relationship has the power to sustain, soothe, and provide hope, thus allowing that relationship to be remembered, even when the other person is not present" (Limbo & Kobler, 2010, p. 318). Professionals must seek to provide effective support and to empower women to seek what they find most helpful. Ascertaining the meaning of the loss to the family will guide the process. With education and understanding of the methods used for diagnosis and treatment of miscarriage and with the tools to create memories for families as desired, healthcare providers will be positioned to provide respectful, compassionate bereavement care for families experiencing miscarriage.

A woman should be able to have a full-term pregnancy after one, or even two miscarriages (Limbo & Wheeler, 1986–2003); however, healthcare providers should not assume that a woman having a successful pregnancy subsequent to a pregnancy loss is confident and unconcerned about the outcome. Inquiring about how she is feeling about the current pregnancy and taking time to truly listen to her response may help the healthcare provider understand the impact of the miscarriage experience.

Healthcare professionals must educate themselves about the clinical aspects of miscarriage and strive for a clearer

understanding of the potential grief embodied within the experience. With that, they can provide care that is based on how the woman and her family view the miscarriage, their belief system, values, and expectations. Doing so establishes compassionate care for the thousands of families experiencing this type of early pregnancy loss. ✦

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