MIDWIFERY MANAGEMENT OF FIRST TRIMESTER BLEEDING AND EARLY PREGNANCY LOSS

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ABSTRACT

As many as 25% of women experience bleeding in the first and early second trimester of pregnancy; about half of these will have a miscarriage or, more rarely, ectopic or molar pregnancy loss. This can be a difficult time for women because of the uncertainty of the outcome, lack of preventative measures, and emotional significance of early pregnancy loss. The qualities that characterize midwifery care, including providing complete information, encouraging self-determination, and being sensitive to the emotional state, are particularly important at this time. This article reviews the epidemiology; physiologic process; signs and symptoms of first trimester bleeding; miscarriage and other early pregnancy losses; and methods of clinical, biochemical, and sonographic evaluation. A framework to guide midwifery evaluation and management, based on confirmation of an intrauterine pregnancy followed by the determination of viability, is presented. Surgical, medical, and expectant management of nonviable pregnancy, management of viable pregnancy when bleeding persists, and follow-up care, including screening for psychological sequelae, are discussed. Case studies and specific clinical guidelines for midwifery care, consultation, collaboration, and referral are included. Understanding the emotional significance of first trimester bleeding and loss as a basis for sensitive care throughout the management process is addressed. J Midwifery Womens Health 2000;45:481–97 © 2000 by the American College of Nurse-Midwives.

As many as 25% of women experience bleeding in the first trimester of pregnancy, and about half of these go on to have miscarriages or, more rarely, ectopic and molar pregnancy losses (1). For most women, the experience of first trimester bleeding is difficult because of the threat of loss and uncertainty of the outcome. If loss does occur, the grief can be as profound as for any significant loss. The care a woman receives during this time has a significant impact on her experience. Kennedy (2) describes midwifery care as the "development of a caring relationship built on mutual respect, trust and alliance," within which "the woman, as an individual, directs her care . . . guided in her decision-making and actions" by information provided by a midwife* whose "ever present support . . . (which) provided reassurance and strength . . . (that) was felt and valued." These qualities are especially important to women at this vulnerable time, and midwives can provide women with an important service by managing first trimester bleeding and early pregnancy loss. Providing this care, however, can be challenging and requires an understanding of the epidemiology, physiologic processes, clinical evaluation, management options, and women's emotional and psychological responses and needs. Many certified nurse-midwives (CNMs)* and certified midwives (CMs)* complete their education with little experience managing first trimester bleeding and losses, and, until a recent article in the *Journal of Nurse-Midwifery* (3), there has been little guidance in the professional literature. This article presents a framework for managing first trimester bleeding and early pregnancy loss and offers specific clinical guidelines for providing this care.

PROVIDING CARE TO WOMEN WITH FIRST TRIMESTER BLEEDING AND LOSS

Understanding the emotional impact and significance of first trimester bleeding and loss can help the midwife meet the woman's or couple's needs during the entire experience. An in-depth exploration of the emotional impact and grief associated with early pregnancy loss is beyond the scope of this article; however, key points should be kept in mind throughout the management process.

Pregnancy is a significant event in a woman's life, and attachment to the pregnancy and baby may begin early in the first trimester (4). When bleeding occurs, women know that their pregnancy is at risk, and for many it is a difficult, vulnerable time because of the threat of loss, uncertainty of the outcome, not knowing whether to remain hopeful or begin to grieve, and accompanying feelings of distress, anxiety, and helplessness (4,5). The immediate and attentive care that some women demand from their providers stems from this anxiety and the innate need to ensure survival of the pregnancy (6). If early pregnancy loss occurs, grief can be as intense and complex as for any perinatal or other major loss (6,7).

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* CNMs/CMs and midwives as used herein refer to those midwifery practitioners who are certified by the American College of Nurse-Midwives (ACNM) or the ACNM Certification Council, Inc.; midwifery refers to the profession as practiced in accordance with the standards promulgated by the ACNM.

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TABLE 1
Traditional, Modern, and Proposed Patient-Sensitive Terms and Definitions (1,9–11)

Traditional	*Modern*	*Proposed*	*Definition*
Biochemical pregnancy		Preclinical miscarriage	Pregnancy detected by biochemical test but lost before clinically recognized (first missed period)
Abortion:		Miscarriage	Termination of pregnancy by any means before viability (22 wk, 500 kg)
Spontaneous		Miscarriage	Involuntary loss of pregnancy before viability
Threatened		Threatened miscarriage	Vaginal bleeding in first 22 wk of pregnancy with closed cervix
Inevitable or imminent		Inevitable or imminent miscarriage	Vaginal bleeding in first 22 wk of pregnancy with dilated cervix
Complete		Complete miscarriage	Expulsion of all products of conception
Incomplete		Incomplete miscarriage	Incomplete expulsion of products of conception
Missed	Anembryonic pregnancy or embryonic demise	Delayed miscarriage	Defined as retention of nonviable pregnancy over 2 mo, but in practice refers to a nonviable pregnancy diagnosed before signs of miscarriage and retained an indeterminate time
Habitual		Recurrent miscarriage	Three or more spontaneous abortions
Blighted ovum	Anembryonic pregnancy Embryonic demise		Gestational sac in which embryo failed to develop, or embryonic demise too early to visualize, or reabsorbed

Women surveyed have reported dissatisfaction with care when they believed their bleeding was not considered important, when not given adequate information or time to discuss their feelings, when the significance of the loss was not acknowledged, and when curettage was treated as routine surgery (5,7,8). Women appreciate sympathetic and sensitive care, and, throughout the experience, prefer honest and complete information, even if unfavorable, because it prepares them for what to expect and how to respond (1,4,6,8). Discussing the limitations of evaluation methods and medical care, that there is no prevention for miscarriage, and providing specific guidelines for what to expect physically and emotionally based on possible clinical outcomes are found helpful (5). Facilitating the woman or couple to express their feelings throughout and involving them in decision making is important and allows them some degree of control in a situation in which loss of control is inherent and difficult (5,7). Whenever pregnancy loss is found to be inevitable, or once it occurs, it is important to acknowledge the significance of the loss, provide anticipatory guidance regarding the process of grief, and, to help alleviate feelings of guilt and anxiety, discuss its possible causes (5–8).

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FIRST TRIMESTER BLEEDING AND MISCARRIAGE TERMINOLOGY AND DEFINITIONS

Current terminology for describing first trimester bleeding and loss dates from a century ago when clinical signs and symptoms were the only ways to evaluate pregnancy loss. Despite the advent of accurate methods for detecting viability and predicting the prognosis of the pregnancy, these terms remain in use. For involuntary loss before 22 weeks, the term "spontaneous abortion" is commonly used. However, sensitivity to language is important when providing care. Even when preceded by "spontaneous," the term "abortion" can be distressing to women experiencing miscarriage; using words such as "miscarriage" and "baby" is preferable to spontaneous (threatened, missed) abortion and embryo or fetus (8). Table 1 presents traditional, modern, and patient-sensitive terms with their definitions (1,9–11). For the purpose of this article, "first trimester bleeding and loss" encompasses bleeding and loss in the early second trimester, to about 14 weeks' gestation, because these are primarily embryonic losses that are only recognized in the early second trimester, and the causes, evaluation, and management are the same (9).

EPIDEMIOLOGY OF FIRST TRIMESTER BLEEDING AND MISCARRIAGE

Incidence of First Trimester Bleeding and Miscarriage

Approximately 20–25% of women experience some degree of vaginal bleeding in the first and early second trimesters of pregnancy; of these, about 40–50% of these experience a miscarriage, ectopic, or molar pregnancy loss (1,12,13). The reported incidence of first trimester pregnancy loss varies among studies because of differences in terminology and methodology and unreported and undocumented losses. The incidence of loss in pregnancies detected biochemically, before clinical or personal recognition, is estimated to be 13–22% in the most recent studies; these early losses are usually followed by viable pregnancies (14,15). The incidence of miscarriage in recognized pregnancies is 12–15%, whereas an incidence of 15–20%, which includes ectopic and molar pregnancy loss, is commonly cited (9,11,12,16).

Causes of First Trimester Vaginal Bleeding

The most common cause of first trimester bleeding is threatened or inevitable miscarriage. About 30% of these pregnancies are nonviable at the time of initial presentation (13). Although ectopic pregnancy is much less common than miscarriage, it must always be considered when there is vaginal bleeding because of the possible rapid progression to a surgical emergency if diagnosis is delayed. Gestational trophoblastic disease is a rare cause. Other causes of bleeding include: physiologic "implantation bleeding," which usually occurs by the time the missed period is due, bleeding from friable cervical tissue, polyp, or lesion, which often occurs postcoitally, and, rarely, bleeding or clotting disorders (3). A recent study also suggests an association between first trimester bleeding, bacterial vaginosis (BV), and genital infections caused by *Trichomonas vaginalis* and *Chlamydia trachomatis* (17).

Causes of Early Pregnancy Loss and Miscarriage

An abnormal embryo or fetus is the cause of most miscarriages, and this information can help alleviate the feelings of guilt and self-blame that are common (7). Chromosomal abnormalities account for at least 50%, and as many as 76%, of embryonic demises and for most anembryonic pregnancies (18–20). Causes of chromosomally normal losses include developmental defects, maternal disease states or infection, uterine and cervical abnormalities, and hormonal disruptions (21). Substances such as tobacco, alcohol, caffeine, and environmental contaminants have been investigated regarding their contribution to early loss; although some show an association, findings have not been consistent. Appendix A shows known, probable, and possible causes of or risk factors for miscarriage. When a woman has had any of these problems or exposures, addressing her (possibly unspoken) concern about its association with pregnancy loss and providing honest information about possible causes can alleviate guilt and encourage healthy behaviors in the future (5–7).

The incidence of miscarriage increases with maternal age and rises sharply in the mid to late thirties (22,23); indeed, women older than age 40 have a risk of 26% and by 45 it is 33% (24). One previous miscarriage does not change a woman's risk in a future pregnancy; however, "recurrent miscarriage" of three or more does increase the risk to 30–50% (25).

Symptoms Associated with First Trimester Bleeding and the Process of Miscarriage

When a pregnancy becomes nonviable, the secretion of placental hormones decreases; this leads to a decrease in placental vascularity, decidual necrosis, and uterine irritability, which, in turn, results in uterine bleeding and expulsion of the uterine contents (26). Embryonic demise usually precedes the onset of vaginal bleeding by up to 2 weeks, and uterine contents can be retained after embryonic demise or anembryonic pregnancy for up to 4–6 weeks (1,26).

The pattern, duration, and severity of bleeding and pain with threatened pregnancy loss are highly variable and are not reliable predictors of the outcome of pregnancy (11). The bleeding can be light pink, red (fresh), or brown (old) in color and can vary from spotting to frank hemorrhage (11). Bleeding may last a few hours, days, or weeks; may be constant or intermittent; and may vary in amount from day to day (11). Bleeding that persists without resolution can be stressful. Abdominal pain varies in timing, intensity, duration, location, and quality. Some women have no pain, many have mild to moderate anterior or lower back cramping, and, rarely, pain can be severe and rhythmic, similar to labor, during expulsion of the tissue (21). Unilateral lower abdominal pain indicates the need to assess for an ectopic pregnancy (EP).

The process of inevitable miscarriage also varies among women, but common patterns exist. At some point, which may be hours, days, or weeks after its onset, the bleeding becomes heavier and, for a few hours may be very heavy. Crampy pain often begins when the bleeding increases. Usually within a few hours of heavy bleeding and cramping, the tissue is expelled. In most cases, no recognizable embryo or fetus can be seen. When all of the tissue is expelled, bleeding and cramping substantially decrease, and the woman feels noticeably

better. When a miscarriage is incomplete, bleeding and cramping may temporarily cease but will recur.

GENERAL CONSIDERATIONS IN THE EVALUATION AND MANAGEMENT OF THE WOMAN WITH FIRST TRIMESTER BLEEDING

The evaluation of first trimester bleeding is a significant component of its management and, although it does not affect the outcome, the information it yields regarding prognosis of the pregnancy is important to women who are bleeding (1). A framework within which the midwife may evaluate clinical findings and plan further evaluation and management consists of confirming an intrauterine pregnancy, if indicated, and determining whether the pregnancy is potentially or currently viable or if it is nonviable. Evaluation and management strategies depend on the history, clinical findings, and the personal preferences of the woman herself. When bleeding is light, or has resolved, telephone evaluation and counseling may be appropriate; however, even women with light bleeding experience anxiety and a thorough examination can be reassuring (1). An examination is required if bleeding is heavy or persistent, if there is significant pain, or if the woman herself wants to be seen and evaluated. Some women want a full evaluation, whereas others are comfortable simply waiting to see what happens. An outline for managing first trimester bleeding and loss is presented in Appendix B.

History and Physical Examination

The midwife should review the specific concerns of the woman, characteristics of the bleeding and associated symptoms, the course of the current pregnancy, gestational age data, and relevant data from previous pregnancies. The physical examination includes inspection of the vaginal vault for the presence and amount of blood, visualization of the cervix for dilatation and/or embryonic tissue, palpation of the uterus for size and of the adnexae for tenderness and masses, and auscultation of the embryonic or fetal heartbeat after 10–12 weeks gestation (later if the uterus is retroverted). Although the diagnosis of nonviable pregnancy is often prompted by the onset of vaginal bleeding, in cases of "missed abortion" or "delayed miscarriage," the nonviable pregnancy is diagnosed before bleeding occurs, often as a result of the inability to auscultate the embryonic or fetal heartbeat. The components of the history and physical examination that may be relevant are listed in Appendix C.

Assessing the Need for and Providing Urgent Care

In rare cases, if excessive bleeding has occurred or is suspected, or if there is significant pain, the woman should be seen as soon as possible in a setting that has the capacity for providing emergency care. The amount and rate of visible blood loss should be assessed at first contact. Signs and symptoms of hypovolemia may not be apparent, because young healthy women maintain blood pressure until late in the process, and orthostatic blood pressure changes do not occur until 10–15% of blood volume is lost (27). A complete blood count should be obtained but will be abnormal only with significant blood loss. Management usually combines surgery with replacement of fluids, electrolytes, and, rarely, blood products. The midwife may perform the initial assessment and refer the woman to physician management while continuing to provide midwifery support and follow-up care. The first priority is to address the woman's urgent physical needs, but it is also important to acknowledge the pregnancy loss at an appropriate time.

Administration of Rho (D) Immunoglobulin

Fetomaternal hemorrhage and Rhesus (Rh) isoimmunization can occur early in the first trimester of pregnancy. One study showed that 11% of women with a threatened miscarriage had fetal cells in maternal circulation (28). Any woman who has vaginal bleeding in pregnancy, whether the pregnancy continues or ends in a loss, should have her blood type determined, and all Rh-negative women should receive Rho (D) immunoglobulin (RhoGAM) intramuscularly within 48–72 hours of the onset of bleeding (27). Before 12 weeks, the dose of RhoGAM is 50 μg; after 12 weeks, it is 300 μg.

Methods Thought to Prevent Miscarriage

Historically, many methods to prevent miscarriage have been tried, giving the provider and woman a feeling of doing something useful; but no benefit to their use has been shown. Bed rest has commonly been advised, with no proven benefit; avoiding intercourse is recommended when there is bleeding in pregnancy, but without data from clinical studies (29). Progesterone supplements have been prescribed empirically, but studies show that they have no benefit except in documented cases of luteal phase defect (30). Most women appreciate an honest explanation that no treatment will prevent miscarriage (5).

Consultation, Collaboration, and Referral

Midwifery practices will have individual agreements with physician colleagues for consultation, collaboration, and referral. In some services, many clinical problems are managed independently, through consultation alone, or collaboratively, and referral is limited to surgical procedures and management of ectopic or molar preg-

TABLE 2
Suggested Indications for Physician Consultation, Collaboration, or Referral (May Not Be Inclusive)*

Severe pain: lower abdominal, unilateral or bilateral, shoulder pain
Excessive blood loss: known, suspected, acute, chronic
Fluid/electrolyte imbalance
Signs/symptoms of infection
Adnexal mass, tenderness, or other abnormal clinical findings
hCG levels <1,500 IU/L that increase more slowly than expected
Presumed diagnosis of, strong suspicion for, or abnormal sonographic findings suggesting ectopic pregnancy
Curettage chosen or clinically indicated before or after trial of expectant management
Incomplete miscarriage with significant bleeding and/or pain
Amount of time to complete expulsion interferes with physical/emotional well-being (curettage suggested)
Woman desires to wait for spontaneous passage of tissue over 4 wk after diagnosis of nonviable pregnancy
Serum hCG levels do not decline normally after miscarriage or curettage clinically thought to be complete
Fetal (not embryonic) demise
Suspected or diagnosed gestational trophoblastic disease (*gynecologic oncologist suggested*)
Request of woman/couple
Reproductive endocrinologist suggested
3 or more miscarriages
2 or more miscarriages in woman who is in mid-thirties or older, has contributory medical condition, or has significant anxiety about future miscarriage
Infertility history or previous pregnancy conceived with assisted reproductive technology
Psychiatric provider suggested
Current depression, anxiety disorder, or other psychiatric disorder
Symptoms of complicated grief reaction: persistent symptoms of grief, depression, or anxiety; somatic complaints without physical cause; inability to perform daily activities; disproportionate concerns or grievances; unrealistic idealization of the pregnancy or baby

* The guidelines differentiating among consultation, collaboration, and referral vary among midwifery practices.

nancies; in others, referral may be necessary for a wider range of abnormal findings. Table 2 presents suggested indications for physician consultation, collaboration, and referral.

CONFIRMING AN INTRAUTERINE PREGNANCY—RULING OUT ECTOPIC PREGNANCY

Evelyn,† a 35-year-old Gravida (G) 4 Para (P) 2012, calls to report mild cramps and brown spotting for 3 weeks, which began a week after her short last menstrual period. A serum hCG obtained later that day is 4,906 IU/L and an ultrasound evaluation obtained immediately shows no intrauterine gestational sac. An ectopic pregnancy is presumed, and she is started on methotrexate therapy.

† The clinical scenarios presented in this article are composites of a number of real clinical situations. All names and specific clinical and personal details have been changed.

The first step in the evaluation and management of first trimester bleeding is to confirm an intrauterine pregnancy in any woman who has risk factors for or symptoms of an EP. The incidence of EP has increased significantly from 4.5 to 20 per 1,000 pregnancies between 1970 and 1992, although, primarily because of early detection, its associated mortality rate has decreased from 3.5 to .3 deaths per 1,000 EPs (31,32). Nevertheless, complications from EPs still account for 9% of pregnancy-related deaths (31). Because of this, it is important to maintain a high level of suspicion for EP, despite its low likelihood in an individual woman with bleeding, because early detection is essential to prevent ectopic rupture and increases the likelihood of preserving fallopian tube patency.

Risk Factors for EP

Any condition that affects the patency and function of the fallopian tube increases the risk for EP. As derived from recent meta-analyses, the greatest risk factors for EP appear to be previous tubal surgery, previous EP, documented tubal pathology, in utero exposure to diethylstilbestol (DES), current use of an intrauterine device (IUD), and in vitro fertilization. Women with these risk factors should be evaluated to rule out EP as soon as pregnancy is reported (33). An infertility history, previous pelvic infection, multiple sexual partners, and cigarette smoking have also been found to moderately increase risk (33–35). However, many women with an EP have no risk factors.

Methods of Evaluating for EP

History and physical examination. Only 60–85% of women with an EP have bleeding (32); when it does occur, it is usually irregular, often prolonged, light and brownish, rarely profuse, and is due to the inability of the trophoblastic tissue to support the decidua. Abdominal pain is the most common complaint, present in about 95% of women with EPs; fever is rare (32). The clinical manifestations vary widely with gestational age and whether rupture has occurred, ranging from minimal discomfort to an "acute abdomen" with symptoms of shock (32,33). The latter, a classic, but now uncommon, picture of ruptured EP, requires immediate referral to physician management for emergency surgical intervention (27,36).

On physical examination, there may or may not be uterine enlargement or adnexal or cervical motion tenderness. Depending on gestational age, there may be a palpable adnexal mass, often soft and pliable, but firm

and tender if distended with blood (32). Findings that increase suspicion for EP include cervical motion tenderness, unilateral or bilateral abdominal or pelvic tenderness, and the presence of peritoneal signs; however, clinical findings cannot reliably confirm or exclude the diagnosis of EP (37). Therefore, biochemical and ultrasound evaluation are necessary, and these may be done before physical examination.

Serum Human Chorionic Gonadotropin. The active β-subunit of serum human chorionic gonadotropin (hCG) is measured in international units per liter (IU/L) or in milli-international units per milliliter (mIU/mL); the reference values in current use are the numerically equivalent International Reference Preparation (IRP) and the Third International Standard (3rd IS). Serum hCG is secreted by the trophoblast about 6 days after conception and can be detected in maternal serum on day 9–11 (36). At the time of the first missed period, the level is 50–250 IU/L (27). It increases rapidly in early pregnancy, doubling every 1.5–2 days in the first 40 days, but by 7–8 weeks only doubles every 3–3.5 days. Serum hCG peaks at approximately 100,000 IU/L at 8–10 weeks, and then falls to approximately 10,000 IU/L by 20 weeks, where it remains until the end of pregnancy (27).

A single hCG level cannot predict whether pregnancy is normal because of the overlap of levels in both normal and abnormal pregnancies (38); following serial hCG levels every 2–3 days is necessary for evaluation but may still be inconclusive. In most normal pregnancies, there is an increase of at least 66% between two samples drawn 48 hours apart or 100% when 3 days apart (32). A subnormal doubling rate is seen in EPs but also occurs in nonviable intrauterine pregnancies and in 15% of normal pregnancies (33,39).

Serum hCG and transvaginal ultrasound. The use of serum hCG and transvaginal ultrasound (TVS) in combination is a highly accurate and noninvasive way to detect EP (38,40). The "discriminatory zone" is the hCG level at which the gestational sac of an intrauterine pregnancy should be seen with ultrasound confirming an intrauterine pregnancy and essentially ruling out EP, because a coexisting intrauterine and ectopic pregnancy is rare in spontaneously conceived pregnancies (21,32). With abdominal ultrasound an intrauterine sac should be seen when the hCG level is 6,500 IU/L or higher (38). TVS, now in current use, allows visualization of the gestational sac at much lower hCG levels, between 1,000–2,000 IU/L in singleton pregnancies (41,42) but higher in multiple gestations (43). In an intrauterine pregnancy, a gestational sac will be visualized in 95% of cases when hCG reaches 1,500 IU/L and in all cases when it reaches 2,000 IU/L (38,40) or an EP is presumed. Rarely, between 4.5 and 6 weeks, the diagnosis of EP may be confounded by the presence of a "pseudogestational sac" on TVS, an intrauterine fluid collection that mimics a true gestational sac. If an apparent sac is noted on TVS without a yolk sac or other evidence of an intrauterine pregnancy, an EP should not yet be ruled out, and careful sonographic follow-up should be planned (44).

Serum Progesterone. The usefulness of a single serum progesterone measurement in screening for EP has been proposed and debated by researchers (45–47). If a serum progesterone level is less than 5 ng/mL, a normal pregnancy may be excluded with certainty; if greater than 25 ng/mL, a normal pregnancy is likely, and EP can be excluded with 97.5% sensitivity (35). However, most serum progesterone levels fall between 5 and 25 ng/mL, which is inconclusive, thus limiting its practical value in the evaluation of EP (45,47).

Suction Curettage. Suction curettage may be performed in cases when the pregnancy is known to be nonviable, serum hCG levels and TVS have failed to distinguish between an EP and intrauterine pregnancy, and data regarding the presence or absence of intrauterine tissue is required to diagnose and manage a possible EP (33,36). The decision to proceed to curettage in the evaluation of EP is made in collaboration with a physician after a thorough physical, biochemical, and sonographic evaluation and consideration of its risks and benefits.

Confirming an Intrauterine Pregnancy

An EP is presumed if a gestational sac is not seen when the hCG level is 2,000 IU/L or greater, and referral to physician management is indicated. If no gestational sac is seen when hCG levels are between 1,500–2,000 IU/L, the ultrasound should be repeated when the hCG is greater than 2,000 IU/L. The diagnostic accuracy of TVS is poor when hCG levels are less than 1,500 IU/L (48). Careful monitoring of both hCG levels and TVS has been shown to be reliable and safe, preventing unnecessary invasive procedures; in some cases, hCG levels will decline spontaneously (49). However, low hCG levels that increase at a subnormal rate suggest an elevated risk of EP, and waiting until they reach 1,500–2,000 IU/L may unacceptably delay diagnosis and increase the risk of ruptured EP. Therefore, clinical judgment and collaboration with or referral to physician management is indicated in these cases. Although the guidelines for determining whether a pregnancy is intrauterine or ectopic are fairly straightforward, the actual management can be challenging. It is important to keep in mind that EP is also a pregnancy loss.

TABLE 3
Abdominal and Transvaginal Sonographic Criteria for Normal and Abnormal Pregnancies (1,50,51)

Criteria	*Measurement*	*EGA*	*Normal Findings*	*Abnormal Findings*
Abdominal ultrasound				
Gestational sac	25 mm		Embryo present	No embryo present (anembryonic pregnancy)
Crown-rump length	10 mm	7 wk	Cardiac activity	No cardiac activity
Transvaginal ultrasound				
Gestational sac	20 mm		Embryo present	No embryo present (anembryonic pregnancy)
			CRL at least 2 mm	CRL < 2 mm
			Cardiac activity	No cardiac activity
			HR at least 75 bpm	HR < 75 bpm
Crown-rump length	5 mm	6.6 wk	Cardiac activity	No cardiac activity
			HR at least 100 bpm	HR < 100 bpm
Crown-rump length	10 mm	7.1 wk	Cardiac activity	No cardiac activity
			HR at least 120 bpm	HR < 120 bpm
Crown-rump length	15 mm	7.9 wk	Cardiac activity	No cardiac activity
			HR at least 130 bpm	HR < 130 bpm

Notes: CRL = Crown-rump length; HR = heartrate.

DETERMINING CURRENT OR POTENTIAL VIABILITY

> Cindy, a 33-year old G1P0 at 10 weeks' gestation, has had intermittent spotting for 4 weeks. At 5–6 weeks, a serum hCG was 135,064 IU/L; a week later an ultrasound showed a 7-week viable intrauterine pregnancy. Now her bleeding has increased, and she is distressed. A second ultrasound shows an 8-week size embryo with no heartbeat. Cindy decides to wait for a spontaneous miscarriage.

If there are no risk factors for or symptoms of EP, or if an intrauterine pregnancy has been confirmed, the next step in the evaluation and management of first trimester bleeding is to determine whether the pregnancy is viable, potentially viable, or nonviable. Evaluation of viability is indicated for all women whose bleeding or pain is significant, and, because the degree of bleeding or pain does not predict outcome and uncertainty can be more stressful than unfavorable information, it should also be offered to all women whose bleeding is persistent, recurrent, causes anxiety, and who request it (1).

Methods of Evaluating Viability

Serum hCG and Serum Progesterone. A single serum hCG level has no value in predicting pregnancy outcome, and serum progesterone is often inconclusive. Serial hCG levels have some value before 6½ to 7 weeks' gestation when an ultrasound can still be inconclusive. A rise in serial serum hCG levels of at least 66% in 2 days or 100% in 3 days is consistent with a normal pregnancy (32), providing limited reassurance. However, a rise of less than this is inconclusive because it is seen in 15% of normal pregnancies as well as in ectopic and nonviable intrauterine pregnancies (33,39). Falling hCG levels suggest a nonviable intrauterine pregnancy.

Abdominal and Transvaginal Ultrasound. After 6½ to 7 weeks, ultrasound is the best predictor of pregnancy outcome. Because menstrual dates are not always consistent with gestational age, sonographic criteria have been developed to differentiate between normal and abnormal pregnancies (1,50,51). See Table 3. When the gestational sac is 20 mm or greater with TVS (25 mm with abdominal ultrasound), an embryo should be visualized with TVS, or the diagnosis is an anembryonic pregnancy. When the crown-rump length is 5 mm or greater using TVS, corresponding to a gestational age of 6 weeks, 4 days (10 mm or greater at 7 weeks with abdominal ultrasound), an embryonic heartbeat should be seen, or the diagnosis of embryonic demise is made.

Gestational Trophoblastic Disease and Hydatidaform Mole

> Irene, a 33-year-old G1 P0, has an ultrasound for spotting at 7 weeks that shows a nonviable pregnancy with intrauterine echoes, suggesting a possible molar pregnancy. A suction curettage is performed; the pathology report is normal. At her follow-up visit, she says she doesn't feel quite right, and a urine pregnancy test is positive. Her serum hCG is 12,800 IU/L, and a subsequent ultrasound shows retained uterine tissue consistent with a molar pregnancy. She is referred to a gynecologic oncologist, a second curettage is performed, and the pathology report confirms gestational trophoblastic disease. Her hCG levels fall normally, ruling out choriocarcinoma and the need for chemotherapy. She is put on oral contraceptive pills for 6 months and, subsequently, has a healthy term baby.

Gestational trophoblastic disease (GTD), including hydatidaform mole, is rare, with an incidence of 1 in

1,000–1,500 pregnancies (27). The clinical presentation is similar to other nonviable pregnancies, and the unexpected diagnosis is often made by ultrasound (1). Sonographically, a molar pregnancy varies with gestational age; it classically has a "snowstorm-like" mixed echogenic appearance, indicating hydropic villi and intrauterine hemorrhage, and is not always obvious (1,27). Referral to physician management is indicated, because the woman will require an immediate surgical evacuation of the uterine contents, follow-up of the tissue pathology, and serial hCG levels to rule out choriocarcinoma, which occurs in 2–5% of cases (11). When discussing the clinical findings and management with a woman, it is important to acknowledge this as a pregnancy loss.

MANAGEMENT OF PREVIABLE AND VIABLE PREGNANCY WHEN BLEEDING CONTINUES

> Jane, a 28-year-old G3 P0020 with two previous miscarriages, has had spotting for 2 days and is worried. An ultrasound shows an 8-week viable embryo with a heartrate of 154 and a small subchorionic hemorrhage. The findings and prognosis are discussed. The bleeding resolves, and she has a normal pregnancy and term baby.

> Sue, a 24-year-old G2 P1001, has light bleeding and cramping at 7 weeks' gestation. An ultrasound shows a live embryo in the uterus, but the heartrate is 73. The poor prognosis for the pregnancy is discussed and she miscarries a few days later.

If ultrasound confirms an intrauterine pregnancy but the gestational age is too early for cardiac activity to be detected, it can be repeated after 6½–7 weeks. When there is vaginal bleeding, a viable embryo is a reassuring finding, but a small risk of miscarriage persists, decreasing from the overall 12–15% incidence to approximately 5% in most pregnancies (52,53). Reevaluation for viability may be indicated if bleeding continues.

Factors That Increase Risk for Miscarriage in a Viable Pregnancy with Bleeding

In all cases, there is a greater risk of miscarriage the earlier the gestational age and higher the maternal age (23). Certain sonographic findings increase the risk of miscarriage when there is a viable embryo. These include bradycardia (54,55); an abnormally small, large, or distorted sac (55,56); and a small-for-dates crown-rump length (56). In about 20% of cases when there is first trimester vaginal bleeding in a viable pregnancy, an ultrasound shows a subchorionic hemorrhage or hematoma (SCH), a collection of blood between the membranes and the uterine wall that does not affect placental function (57). Most studies show that a small- to moderate-sized SCH does not increase the risk of miscarriage beyond the risk attributable to the bleeding itself, but there may be an increased risk with a large SCH, greater than 16 mL or involving more than two thirds of the sac circumference (57–59).

The Effect of First Trimester Bleeding on Viable Pregnancy Outcomes

Many studies show that women who have had first trimester bleeding have an increased risk of adverse pregnancy outcomes including low birth weight, preterm birth, and associated increased perinatal and neonatal mortality (60,61). A large 10-year study found these problems were associated with heavy, but not light, bleeding (62). A recent clinical trial showed an association between first trimester vaginal bleeding, common reproductive tract infections (BV, *Trichomonas vaginalis*, and *Chlamydia trachomatis*), and preterm birth and suggests that treating these infections may decrease risk (17). Given these findings, it is important to evaluate women with first trimester bleeding for reproductive tract infections, treat these if indicated, and carefully follow pregnancies in which there has been moderate to heavy bleeding for fetal growth and signs and symptoms of preterm labor.

MANAGEMENT OF NONVIABLE PREGNANCY

> Ellie, a 42-year-old G1 P0, with a long-awaited pregnancy begins bleeding at 11 weeks' gestation. On examination her cervix is closed, with dark blood in the vaginal vault, the uterus is 9–10 week size, and no heartbeat is detected with a handheld Doppler. An ultrasound the following day shows an anembryonic pregnancy. The options for management are discussed; she requests a suction curettage, which is arranged.

> Diane is a 31-year-old G4 P2012 at 10 weeks' gestation who is seen for spotting. Her uterus is 8-week size with no heartbeat, and an ultrasound confirms an embryonic demise. After discussing the options, she decides to wait for a miscarriage. Ten days later she has heavy bleeding and passes the tissue. On examination the next day, her uterus is small, firm, and nontender, and a probable complete miscarriage is presumed. Serum hCG levels decrease, and her 2-week follow-up examination is normal.

When a pregnancy is found to be nonviable, it is the responsibility of the provider to discuss and plan the management for evacuation of the pregnancy tissue with the woman or couple. Despite the frequency of nonviable pregnancy and miscarriage, there is relatively little research on their natural course and optimal management. Routine surgical evacuation remains standard practice in this country, dating from decades ago when the incidence

and consequences of sepsis and hemorrhage were significant. Today, however, this practice is increasingly questioned by clinicians and in the literature (63–65). The use of biochemical markers and ultrasound permits earlier diagnosis of nonviable pregnancy than in the past, the incidence of infection and hemorrhage is low with effective treatment widely available, and the benefit of routine curettage over expectant management has never been proven (63–65).

Methods of Uterine Evacuation for Nonviable Pregnancy

Surgical Management. Sharp curettage has been replaced by suction curettage for evacuation of uterine contents, with equal efficacy and greater safety (66). Intravenous sedation is the best method of pain management during the procedure, because it has fewer risks than general anesthesia and is more effective than nonsteroidal anti-inflammatory drugs or paracervical block. Complication rates range from 4–10% (26,63,67) and, in addition to those associated with the use of anesthesia, include excessive blood loss, retained tissue, infection, uterine perforation, cervical injury, uterine adhesions, and Asherman's syndrome, all of which can affect subsequent fertility (26,63,65).

Immediate surgical management is indicated for unstable vital signs, actual or suspected excessive blood loss, significant pain, and signs of infection. Nonemergent surgical evacuation is also indicated for signs of gestational trophoblastic disease, when there is a need to document the presence of intrauterine pregnancy tissue to rule out an EP or for cytogenetic testing of tissue in the evaluation of recurrent miscarriage, if a woman chooses it, and when expectant management (EM) has failed (63). A referral to physician management for surgical evacuation should be made for these, with the midwife continuing to provide care before and after the procedure.

Medical Management. The antiprogesterone and antineoplastic agents mifepristone and methotrexate, and the prostaglandin analogue misoprostol, have been used safely and successfully for uterine evacuation in elective termination of first trimester pregnancies (68). In recent years, this method has been investigated for use in nonviable pregnancy to avoid the risks of surgical curettage and the uncertain timing of spontaneous expulsion. Trials have shown varying degrees of success, some as high as 82–95% (69–71), but others only 13–52% (72–74). Side effects are common, with up to 88% of women reporting nausea, vomiting, diarrhea, headache, dizziness, and hot flushes (69,74); women with an involuntary loss may be less tolerant of these than those who choose termination. Although medical evacuation has no significant risks, its disadvantages, including undesirable side effects, the need for intensive follow-up, and poor success rates, limit its clinical usefulness at present.

Expectant Management. The safety and efficacy of EM have been explored in recent studies. Women with a small gestational sac or minimal intrauterine tissue have been found to have spontaneous miscarriages without an increased incidence of complications (75,76). Schwarzler et al (77) used broad inclusion criteria—nonviable pregnancy at less than 13 weeks' gestation with vaginal bleeding and/or abdominal pain—and allowed women to choose between expectant and surgical management. Of the 108 women, 84% chose EM and were followed with ultrasound and biochemical markers weekly up to 4 weeks; 54% of these had a complete miscarriage within a week, 62% within 2 weeks, 76% within 3 weeks, and 84% within 4 weeks. No significant differences were found in complications between the expectantly and surgically managed groups and no increase in complications when miscarriage occurred up to 3–4 weeks after the diagnosis of a nonviable pregnancy. This study, although not randomized, shows that many women will opt for EM if given a choice and demonstrates the time frame within which most miscarriages occur.

There have been two prospective randomized trials of EM. Nielsen and Hahlin (78) randomly assigned 155 women up to 13 weeks' gestation with a nonviable pregnancy, bleeding, and an intrauterine tissue diameter of 15–50 mm to expectant or surgical management. Of the expectantly managed women, 79% had a spontaneous complete miscarriage within 3 days, and the remainder required curettage. No significant differences were found in complication rates; follow-up surveys also showed no differences in postmiscarriage symptoms of anxiety and depression or in subsequent fertility (79,80). Chipchase and James (81) performed a smaller trial with similar criteria and methods, and found no significant differences in complications or subsequent fertility. Both studies report that the women themselves found EM acceptable. A recent meta-analysis (65) found that a pooled total of 545 women who were managed expectantly had an overall 92.5% success rate and no increased incidence of complications; the authors conclude that EM miscarriage is safe and effective if there is no excessive bleeding, unacceptable pain, or signs of infection.

Clinical findings shown to be associated with a greater likelihood of success with EM include earlier gestational age, low hCG levels, less intrauterine tissue, and the presence of blood in the intervillous space of the placenta with color Doppler imaging (75–77,82). However, studies also show that many women at various gestational ages and with varying amounts of intrauterine tissue have uncomplicated spontaneous miscarriages and that more

than half of women miscarry within a week of the diagnosis of nonviability (77,78,81).

Offering the Options of Surgical or Expectant Management

If there are no clinical indications for curettage, the data from clinical studies support offering the woman or couple the options of expectant or surgical management. This discussion often occurs just after the news of the nonviable pregnancy has been received, with the accompanying shock, distress, and grief, but most women want concrete information about the next step. A description of the options, with benefits, risks, and the range of physical and emotional experiences that may occur with each, should be reviewed. Clinical findings, access to medical care, and family and work responsibilities are also factors to consider. Because of the pain and distress of the experience, and because the risks of both management options are low, the woman's preference should be the most important determinant in the absence of clinical indications. Many women prefer a prompt completion of the miscarriage and request curettage, some want to avoid surgical intervention and prefer to wait for a miscarriage, and others appreciate the option of EM for a certain length of time with a curettage scheduled in 1–2 weeks. Occasionally, a woman is unable to make a decision because of her distress about the pregnancy loss and, if possible, it should be deferred until she can consider her options.

Expectantly Managing Nonviable Pregnancy

If a woman chooses EM, she should be given information about the normal process of miscarriage, what to expect, and when and how to contact the midwife. That an uncomplicated miscarriage is not an indication for hospitalization should be discussed. Although the incidence of infection and hemorrhage is low, their signs and symptoms should be reviewed, and she should be instructed to call if these occur, as well as for any concerns, clinical guidance, and emotional support. She should call after expulsion of the tissue so that an examination to assess completeness of the miscarriage can be planned.

There is little guidance in the literature on following expectantly managed women. In studies, women have been followed with frequent clinical, biochemical, and sonographic evaluations, but these were not evidence based and their purpose has been investigative. Clinical judgment and an assessment of the individual woman's needs should guide midwifery care. Contact with the woman either in person or by telephone should occur at least weekly to assess the process of expulsion, potential complications, and to provide support. When there is bleeding, waiting up to 3–4 weeks for spontaneous expulsion of tissue after the diagnosis of a nonviable pregnancy has not been associated with an increase in complications (77). In cases of nonviable pregnancy without bleeding (delayed miscarriage or missed abortion), the length of time safe to wait for spontaneous expulsion has not been studied. Historically, concern about the risk of coagulation problems resulting from prolonged retention of intrauterine tissue has led to recommendations for immediate surgical evacuation (21), but no studies show that these occur in the first and early second trimester (1). Most women with a delayed miscarriage will not want to wait unduly long, and most miscarriages will occur within 4–6 weeks after a demise (1). For the rare woman who does want to wait for as long as it takes, collaborative management with a physician is advised. If there is any indication for curettage, or if the woman chooses it, she should be referred to physician management.

Initial Follow-up for Expectantly Managed Nonviable Pregnancies and Miscarriages

After the expulsion of tissue, it is essential to determine whether a miscarriage is complete. Recent studies show that an incomplete miscarriage does not always require immediate curettage (63,83), but it must be recognized and a management plan made, either expectant or surgical. A physical examination, and, in some cases, evaluation with ultrasound or serial hCG levels are necessary shortly after or, if the woman's symptoms are stable, within a few days of expulsion. A woman who has a complete miscarriage often reports passage of an intact globular mass of tissue, followed immediately by decreased bleeding and cramping, and then she feels much better. Clinical indications that a miscarriage is complete include light vaginal bleeding, a closed, nontender cervix, and a firm, nonpregnant-shaped uterus no larger than 6 weeks' gestational size. When a miscarriage is not complete, the bleeding and cramping may decrease but will usually resume some time later. On examination, vaginal bleeding often persists, is usually moderate to heavy, but may be light, and the uterus is soft, rounded, and may be enlarged. If the woman has saved and brought in the tissue, it should be examined for the presence of villi.

When completeness of the miscarriage is uncertain, follow-up evaluation with an ultrasound or serial hCG levels is recommended. Studies have shown that curettage may be safely deferred when no retained tissue is detected by ultrasound (67,84–86). However, in the first week or so after miscarriage, intrauterine fluid or endometrial thickness may make sonographic detection of retained tissue difficult, and a follow-up scan may be required (1,26). Serial serum hCG levels are often less expensive than one ultrasound, but multiple visits, blood

draws, and calls for results are required. In most women, serum hCG levels will decline to zero within 30–40 days after a miscarriage or curettage, but clearance may take up to 97 days (87). A rapid drop in the first 15 days is followed by a slower decline. The possibility of EP or retained intrauterine tissue must be considered if serum hCG levels do not halve within 7 days of miscarriage (27). Following the decline of hCG levels may be useful in early nonviable pregnancies when the passage of tissue may not be obvious; it is advised to rule out unsuspected EP if the presence of intrauterine tissue has not been documented and is suggested as a way to ensure that there is no residual intrauterine tissue even after a normal clinical examination. No data exist regarding intervals at which to measure serum hCG levels after a miscarriage, but the expected rate of decline suggests every 2–3 weeks, and levels should be followed down to zero.

If an evaluation reveals an incomplete miscarriage, the options for management are similar to those for nonviable pregnancy and should be based on clinical findings and the woman's preference (63). Referral to physician management for curettage is indicated if there is excessive blood loss, either acute or chronic, signs of infection, or if the woman requests it. EM may be continued if the woman prefers it, there are no contraindications, and follow-up is in place. One study comparing expectant and surgical management of incomplete miscarriage found no differences in complication rates when ultrasound showed the uterine cavity to contain fluid mixed with solid components or, if it contained solid components only, when the anteroposterior diameter of the uterine cavity measured less than 10 mm (83). In some midwifery practices, collaborative management with a physician may be required for this; in others, midwives may continue independent management. Reevaluating completeness of the miscarriage by clinical examination and, if indicated, with ultrasound or biochemical markers, is necessary when more tissue has passed. Curettage is recommended when the length of time until complete expulsion interferes with the woman's physical and emotional well-being.

FOLLOW-UP CARE AFTER FIRST TRIMESTER LOSS

A follow-up visit is usually scheduled about 2 weeks after the loss; most women attend it and find it a valuable and important component of their care (7,88). Returning to the office to which they came for prenatal care may be difficult for some women, and sensitivity to this is important. The physical examination is focused on reconfirming completeness of the miscarriage or curettage; it is also important to bear in mind that there can be retained tissue after curettage. Bleeding and pregnancy symptoms should resolve 1–2 weeks after the miscarriage or curettage, and there should be normal involution. If there is any suggestion of residual trophoblastic tissue, this should be investigated; if it is detected, a referral for curettage is indicated.

The experience of grief after early loss should be discussed. Women are often surprised at the intensity of their feelings and reviewing the process of grieving can normalize the process for them and support their ability to cope (7). The initial disbelief gives way to feelings of acute grief which is generally most intense within the first 4–6 weeks, gradually diminishes, and usually resolves by 3–4 months, but may persist in some women (4,6,7). The experience of grief can include profound feelings of sadness, emptiness, anger, guilt, anxiety, isolation, and decreased self-worth in addition to fatigue, disturbances in appetite, sleep, and daily functioning (4,6–8); if present, they should be assessed. Preparing women for the implications of miscarriage as an "invisible loss" is helpful; for example, it may be difficult to share the news with others, acknowledgment of the loss and support may not be forthcoming, and the woman and her partner may experience grief differently (7,8). It is also important to review the possible causes of the miscarriage, which may not have been clearly heard or understood previously because of distress; not receiving this information has been found to increase anxiety and other psychiatric symptoms (7).

Although grief and depression are not synonymous, studies show that 22–44% of women experience significant levels of depression and anxiety after miscarriage (7,89–92). A subset of women will experience complicated grief reaction, which, in addition to symptoms of depression and anxiety, is notable for persistent grief, somatic complaints without physical cause, disprorportionate concerns or grievances, and unrealistic idealization of the pregnancy or baby (6). Risk factors for psychiatric morbidity include previous or recurrent loss, a history of or current depression, anxiety or other psychiatric disorder, being childless, lack of partner, family, or social support, and concurrent significant life stressors (7,93). Studies vary regarding the effect of a desired or unanticipated pregnancy and feelings of ambivalence; some show that a desired pregnancy may lead to increased grief, whereas ambivalence about the pregnancy may increase the risk of depression (7). Midwives should assess women's risks for psychiatric sequelae and plan follow-up care for those at risk. Women with a known or new depression, anxiety disorder, or complicated grief reaction should be referred to a psychiatric provider for evaluation and management. Individual or group bereavement counseling can be helpful for some women with both normal and complicated grief (6). All women should receive information regarding community resources.

The timing and risks of a future pregnancy, if one is desired, should be discussed at the follow-up visit. It is

safe for women to begin trying to conceive after the first period after a miscarriage, which usually occurs in 4–6 weeks, and after that their own emotional readiness may guide them. No evidence exists that waiting longer is medically necessary or beneficial, and for older women it may be undesirable to postpone pregnancy (14). Preconceptional concerns should be addressed, including the recommendation of a daily supplement of 0.4 mg folic acid to reduce the risk of neural tube defects (94). If the woman does not wish to conceive at present, a contraceptive method is necessary, because ovulation may occur as early as 2 weeks after the miscarriage (21). If a woman has had an EP or gestational trophoblastic disease, the physician who managed her care may have specific recommendations. In both cases, women are at increased risk for recurrence; thus it is necessary to confirm normal intrauterine implantation in all future pregnancies as soon as the pregnancy is discovered. The interconceptional period after gestational trophoblastic disease should be managed in collaboration with or by a physician, often a gynecologic oncologist.

Most women will have concern or anxiety about the possibility of another loss, feelings that often persist into the next pregnancy; thus, the individual woman's risk should be discussed. The information that one previous miscarriage does not increase the risk of another one will be reassuring to women, but the overall incidence of miscarriage is not insignificant. Individual factors that may affect her risk, such as age, should be discussed. About 5% of women have two consecutive miscarriages, and 1% have three or more losses (25). Referral to a reproductive endocrinologist is indicated for women who have had three or more losses but should be considered after two for women who are in their mid-thirties or older, for those who have medical conditions that may be contributory or significant anxiety about another miscarriage. If the woman has an infertility history or conceived this pregnancy with assisted reproductive technology, she should also be referred to a reproductive endocrinologist.

SUMMARY

Women's experiences of first trimester bleeding and loss vary, but for most it is a difficult, vulnerable time. Grief after an early pregnancy loss can be as profound and difficult as after any perinatal or other major loss. Providing care can be challenging for many reasons; these include unclear clinical presentations, complicated evaluation methods, the lack of preventative measures, the difficulty of interacting with women who are anxious and in distress, and the discomfort of witnessing and acknowledging grief and pain when a pregnancy is lost. But, a midwife's care can be particularly valuable to women during this experience. With a thorough understanding of the experience and process of first trimester bleeding and loss, an appreciation of its emotional impact and significance, and using the framework presented herein as a guide for management, midwives can provide sensitive and complete care to women at this important time.

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APPENDIX A

KNOWN, PROBABLE, AND POSSIBLE CAUSES OF AND RISKS FOR MISCARRIAGE (18–22,24,25,95–111)

Known or Probable Cause/Risk	*Possible Cause/Risk*	*No Cause/Risk*
Abnormal embryo		
Genetic/chromosomal abnormalities		
Abnormal morphology		
Maternal factors		
Fever	Abnormal thyroid function	Antithyroid antibodies
Uncontrolled insulin-dependent diabetes	Active chronic gastrointestinal disease	Well-controlled diabetes
Endometriosis (possible selection bias)	Listeriosis	Brucellosis
Systemic lupus erythematosus (slight)	Campylobacteriosis	Psittacosis
Ureaplasma urelyticum (colonized)	*Mycoplasma hominis*	Salmonella
Systemic lupus erythematosus (slight)	Cytomegalovirus	Malaria
Anticardiolipin antibodies	Parvovirus	Syphilis
Alliommune factors	Bacterial vaginosis	Chlamydia
Toxoplasmosis		HIV
Phenylketonuria		Hepatitis B
Documented luteal phase defect		Diethylstilbestrol exposure
Biocornate uterus		
Leiomyomata (no controlled studies)		
Asherman's syndrome, intrauterine adhesions (not definitive)		
Substance use and environmental exposures		
Coffee/caffeine, heavy intake	Coffee/caffeine, moderate intake	Coffee/caffeine, light intake
Cigarette smoking, moderate-heavy		Second-hand smoke
Cocaine	Alcohol intake	Video display terminals
Lead	Anesthetic gases	Ultrasound
Formaldehyde	Industrial chemicals	Shortwaves
	Herbicides	
	Solvents	
	Radiation	
Other factors		
Catastrophic physical trauma	Daily lifting of heavy loads (>9 kg)	Noncatastrophic trauma
Increased maternal age		Physical exercise
Two or more previous miscarriages		One previous miscarriage

APPENDIX B

MANAGEMENT OF FIRST TRIMESTER BLEEDING AND LOSS OUTLINE

Evaluation/Finding	*Action*
Assess for need for urgent care	
• Urgent care indicated	Fluid/electrolyte/blood product replacement Immediate evaluation and management of EP/miscarriage (usually surgical)*
• Urgent care not indicated	Telephone counseling or examination (based on symptoms and patient preference)
Rh neg: administer Rhogam within 72 h of onset of bleeding	
Confirm intrauterine pregnancy if symptoms or high risk factors for EP	
• hCG 2,000 IU/L or greater	TVS
• TVS: + gestational sac = IUP	Confirm viability if bleeding continues
− gestational sac = presumed EP	Refer for management of EP*
• HCG = 1,500–2,000 IU/L	TVS
• TVS: + gestational sac = IUP	Confirm viability if bleeding continues
− gestational sac = inconclusive	Repeat when hCG >2,000 IU/L → see above

APPENDIX B (CONTINUED)

Evaluation/Finding	*Action*
• hCG < 1,500 IU/L	Follow every 2–3 days until 1,500–2,000 IU/L → TVS → see above
hCG < 15,00 IU/L and increasing slowly	Physician consultation, collaboration or referral*
Determine viability	
Indications: heavy or persistent bleeding, signs of infection, anxiety, or on request	
• Before 6½–7 weeks	Serial serum hCG 48 h apart
• At least 66% rise	Reassurance consistent with normal pregnancy, but not diagnostic
• <66% rise = inconclusive	TVS after 6½ weeks
• Falling hCG = probable nonviable	Follow dropping hCG or confirm with ultrasound
• After 6½–7 weeks	TVS
• Embryo +HR = viable pregnancy	Inform that risk miscarriage drops to 5% if bleeding persists (higher: earlier gestational age, advanced maternal age, bradycardia, abnormal sac, large SCH). Reevaluate for viability (Doppler/ultrasound) if indicated. Evaluate for STD and BV; treat if indicated Follow pregnancy for fetal growth, s/s preterm labor
• Gestational sac >20 mm, no embryo = anembryonic pregnancy	Management of nonviable pregnancy
• CRL 5 mm or greater, no HR = embryonic demise	Management of nonviable pregnancy
• Gestational sac <20 mm or CRL <5 mm = gestational age too early	Repeat ultrasound after 6.4–7 wk
• After 10–12 wk (14 if RV uterus)	Doptone/ultrasound
• No HR with doptone at 10–12 (12–14 if uterus RV) weeks	Ultrasound for viability
• Ultrasound or Doppler +HR = viable	Reassure, continue pregnancy care
• Ultrasound: embryonic demise or anembryonic pregnancy	Management of nonviable pregnancy
Management of nonviable pregnancy	
• Indication for surgical management Include patient choice, unstable VS, excessive bleeding/pain, signs of infection need to document/test chorionic villi, failure of expectant management*	Refer for curettage* Discuss causes/significance of loss, grieving
• No indication surgical management	Offer expectant/surgical management, discuss benefits, risks, possible experiences Discuss causes/significance of loss, grieving
Expectant management of nonviable pregnancy	
• Patient chooses expectant management after discussion	Information on what to expect, how/when to call for signs of excessive bleeding, infection, passage of tissue, guidance, support At least weekly evaluation (phone/visit) Evaluate for completeness after expulsion (history, physical examination, tissue examination, ultrasound, hCG)
Management of incomplete miscarriage or curettage	
• Incomplete miscarriage suspected*	Ultrasonogram for retained tissue or follow hCG levels down to 0
• Incomplete miscarriage determined*	Offer options: continued expectant management or curettage*
• Complete miscarriage clinically but no documented intrauterine tissue	Follow hCG levels down to 0
• Normal clinical examination but confirmation of completeness needed/desired	Follow hCG levels down to 0
• Indication for curettage Include patient choice, length of time interferes with well-being, any of above*	Refer for curettage*

* Physician consultation, collaboration, or referral suggested.

APPENDIX C

COMPONENTS OF HISTORY AND PHYSICAL EXAM RELEVANT TO THE EVALUATION OF FIRST TRIMESTER BLEEDING (3,27)

Historic information	
Vaginal bleeding: color, amount, pattern, clots/tissue present, change since onset	
Pain: onset, pattern, location, quality, severity (unilateral pelvic or shoulder pain: need to rule out EP)	
This pregnancy	
Dating criteria: last menstrual period, certainty/normalcy, cycle length/regularity, contraceptive use, pregnancy test date(s)/ results, early sizing, ultrasound	
Previous serum hCG levels, ultrasound(s), + FHR	
Previous problems, visits, symptoms of pregnancy (fatigue, nausea/vomiting, breast tenderness)	
Relevant medical history	
Age, medical problems, medical/surgical history, psychiatric history (depression, anxiety disorder) current medications (OTC, prescribed), herbs, supplements, vitamins	
Recent illness/fever	
Obstetric history	
Gravity, parity, previous pregnancy(ies), miscarriage(s), EP(s), gestational trophoblastic disease(s); infertility history/care	
Gynecologic/contraceptive/sexual history	
STDs, PID, pelvic/tubal surgery, DES exposure in utero, abnormal vaginal bleeding, Papanicolaou, known uterine abnormality/fibroids, endometriosis, ovarian problems, current/ past IUD, recent contraceptive use	
Current partner, number of recent partners, age at first intercourse, STD exposure risks	
Social/personal history	
Relationship with father of baby; marital/family/social support	
History of/current risk of domestic violence/abuse, recent trauma	
History of/current substance use/abuse (street drugs, alcohol)	
Smoking, caffeine, drug use; occupational exposures, exercise	
Feelings about pregnancy (planned/unplanned, accepted, ambivalence), bleeding, threatened miscarriage	
Physical assessment	*Notes*
Vital signs, orthostatic blood pressure, pulse	Orthostatic drop 10 mmHg or 10 bpm increased pulse rate suggests excess blood loss
Abdomen	
Palpate: mass, tenderness, uterine size	Size < dates suggests dating error or nonviable pregnancy
Fetal heart tones, if gestational age appropriate	Should hear FHR with anteverted uterus at 10–12 weeks, 12–14 weeks if retroverted
External genitalia, perineum, labia, anus	
Bleeding: amount, color, source	
Lesions, trauma, varicosities, hemorrhoids	
Pelvic–speculum	
Vaginal lesions, discharge, signs of trauma	
Bleeding: amount, color, source	Chocolate brown blood suggests delayed miscarriage (“missed abortion”)
Tissue in vaginal vault or at os	Indicates miscarriage in process
Cervical lesions, polyp, friability	Possible source of bleeding
Pelvic—bimanual	
Cervical location, consistency, dilatation	Dilated cervix indicates inevitable miscarriage Dilated cervix after expulsion suggests incomplete miscarriage Displaced cervix associated with EP
Cervical motion tenderness	Associated with EP
Uterine size, shape, consistency, tenderness, size/dates discrepancy	Size < dates may indicate abnormal pregnancy (nonviable IUP or EP) or earlier gestational age Six > dates may indicate later gestational age, multiple gestation, or GTD After expulsion, uterus small/firm when complete, soft/enlarged if incomplete
Adnexae: mass, tenderness (severity, location, rebound)	Rule out EP, but may be due to ovarian cyst, torsion
Rectovaginal examination	Not commonly done, may confirm/add to bimanual findings