CHAPTER 96

Abnormal Uterine Bleeding

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INTRODUCTION

Abnormal uterine bleeding is an overarching term that is defined as bleeding from the uterine corpus that is irregular in volume, frequency, or duration in absence of pregnancy (**Table 96-1**).[1] Vaginal bleeding is a common complaint in the ED, and differential diagnoses include pregnancy, structural abnormalities (e.g., polyps, fibroids), endometritis, coagulopathies, trauma, and various other causes. The prevalence of abnormal bleeding is estimated at 9% to 14% in the general population. Although vaginal bleeding may present as an acute or chronic problem, this chapter will focus on the ED evaluation and management of abnormal uterine bleeding.

MENSTRUAL CYCLE

In North America, average age of menarche is 12.5 years of age, approximately 2 years after the development of thelarche (breast budding). Early cycles are often anovulatory and irregular due to the immaturity of the hypothalamic-pituitary axis. Regular ovulatory cycles develop on average 2 years after the start of menarche.

The normal menstrual cycle is 28 days and is divided into four phases: menses, follicular, ovulation, and luteal or secretory. **Figure 96-1** depicts hormonal and endometrial changes associated with a normal menstrual cycle.

In response to the rising estrogen levels, the pituitary gland secretes follicle-stimulating hormone and luteinizing hormone, which stimulates the release of the mature oocyte. The residual follicular capsule forms the corpus luteum. During the luteal phase, the corpus luteum secretes estrogen and progesterone, which maintains the integrity of the endometrium and makes it more receptive to implantation. If fertilization and implantation occur, the developing embryo secretes human chorionic gonadotropin into the bloodstream, signaling the corpus luteum to continue the production of progesterone and estrogen necessary to support early pregnancy. In the absence of human chorionic gonadotropin, the corpus luteum involutes, and estrogen and progesterone levels fall. Hormonal withdrawal causes vasoconstriction in the spiral arterioles of the endometrium. As a consequence, the ischemic endometrial lining becomes necrotic and sloughs, which leads to menses. The vaginal effluvium contains blood, endometrial tissue, and fluid. The average amount of menstrual blood loss ranges from 25 to 60 mL.

The average tampon or pad absorbs 20 to 30 mL of vaginal effluent. However, judging the amount of blood loss by usage may be unreliable because personal habits vary greatly among women. In women with heavy bleeding, there may be insufficient time for fibrinolysis, so blood clots form.

TABLE 96-1 FIGO Terminology for Bleeding*

Type	Definition
Abnormal uterine bleeding	Bleeding that is abnormal in regularity, volume, frequency, or duration. Bleeding may be acute or chronic and is present for at least 6 months.
Heavy menstrual bleeding *(heavy uterine bleeding [HUB] replaces menorrhagia)*	Excessive menstrual bleeding that interferes with a woman's physical, emotional, social, and quality of life. Note that the definition is menstrual bleeding deemed excessive by the patient regardless of duration, frequency, or timing.
Amenorrhea	Bleeding that is absent for >6 months.
Prolonged menstrual bleeding	Menstrual bleeding that is absent for >6 months.
Intermenstrual bleeding *(replaces metrorrhagia)*	Bleeding episodes between normally timed menstrual periods.
Irregular menstrual bleeding	Unpredictable onset of menses, with cycle variations >20 days over a period of 1 year.
Postmenopausal bleeding	Any bleeding that occurs >12 months after cessation of menstruation.

Abbreviation: FIGO = International Federation of Gynecology and Obstetrics.

*Discarded terms include dysfunctional uterine bleeding, menorrhagia, functional uterine bleeding, hypermenorrhea, hypomenorrhea, menometrorrhagia, metrorrhagia, oligomenorrhea, polymenorrhea, and uterine hemorrhage.[2]

CLINICAL FEATURES

HISTORY

Obtaining a focused medical history should include details of current bleeding episode, associated symptoms, and past medical history including reproductive and sexual history (**Table 96-2**). Pregnancy-related bleeding should always be considered and ruled out in reproductive-age patients. Patients may describe heavy bleeding as soaking of more than one pad or tampon within 1 hour or passing large clots. **Up to 20% of women with heavy uterine bleeding have an underlying coagulation disorder, with von Willebrand's disease being the most common.** Screening for history of heavy menstrual bleeding since menarche, postpartum hemorrhage, surgery- or dental-related bleeding, and family history may help guide further evaluation for bleeding disorders. It is also important to ask about oral contraceptive use because missed doses are a frequent cause of bleeding. Questions about drug interactions and smoking are also important in determining the cause of bleeding.

To obtain an accurate sexual history from an adolescent patient, assure physician confidentiality and maintain a nonjudgmental attitude. If a female physician is requested, try to honor the request if at all possible. Always ask the parents for an opportunity to interview the patient without the parent present. Furthermore, all states allow minors to consent to diagnosis and treatment of sexually transmitted diseases and drug abuse without parental consent.

PHYSICAL EXAMINATION

The initial assessment includes evaluation of vital signs and hemodynamic status. However, significant signs of volume depletion may not be present until bleeding is profuse. Perform a focused physical examination including pelvic (speculum and bimanual) and abdominal exam to determine the cause of bleeding and to exclude life-threatening blood loss requiring emergent surgical intervention. Look for signs of other illnesses, including hyper- and hypothyroidism, galactorrhea, obesity associated with hirsutism, and liver disease. Petechiae, purpura, and mucosal bleeding require hematologic investigation.

For pelvic examinations in the ED, both male and female physicians are equally advised to have a chaperone present. Decisions regarding parent or guardian presence during examination of adolescents depend

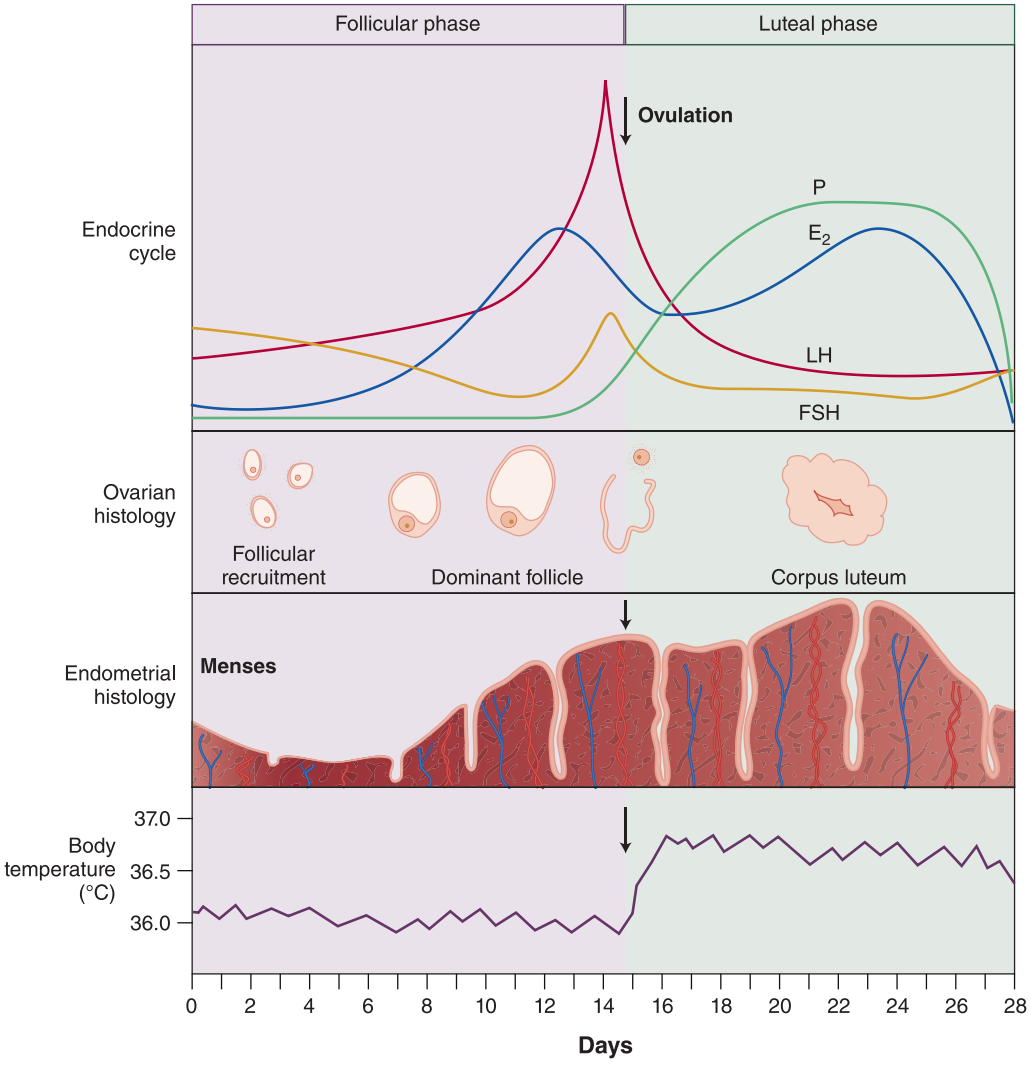

FIGURE 96-1. The hormonal, ovarian, endometrial, and basal body temperature changes and relationships throughout the normal menstrual cycle. E_2 = prostaglandin E_2; FSH = follicle-stimulating hormone; LH = luteinizing hormone; P = progesterone. [Reproduced with permission from Patel DR, Greydanus DE, Baker RJ: *Pediatric Practice Sports Medicine*. © 2009, McGraw-Hill, New York, NY.]

on the patient's age and maturity level. Inspect the perineum, vulva, urethra, and perianal region before internal speculum exam. Evaluate the vaginal canal and cervix for lacerations, fissures, lesions, infection, tumors, and foreign bodies. On bimanual examination, determine the softness and patency of the cervical os, and ask about pain on cervical movement. Palpate the uterus and adnexa for size, consistency, tenderness, and masses.

In a virginal patient, a rectovaginal digital examination is generally sufficient. In the case of trauma, concern for sexual abuse, or vaginal foreign body, a vaginal examination is necessary. Adolescents with intact hymen can generally tolerate a speculum examination if a narrow Pederson-type adolescent or Huffman pediatric speculum is used. Conscious sedation or full anesthesia may be required, depending on the psychological response of the patient, the circumstances, and the extent of the injury or disease.

Several techniques may help facilitate performing a pelvic examination in elderly women, including using a smaller speculum with generous lubrication and proper positioning. Age, immobility, and degenerative joint disease may make it difficulty to place the patient in the dorsal lithotomy position. Patients may be positioned supine, with the head supported with a pillow, and with knees flexed and with hips externally rotated (frog-leg position). The pelvis may be elevated using padding or an upside-down bedpan. If vaginal bimanual examination cannot be performed due to vaginal atrophy, a recto-abdominal approach may be attempted. Abnormalities such as irregular nodules, masses, or thickened rectovaginal septum may suggest malignancy.

CAUSES OF VAGINAL BLEEDING

The causes of abnormal vaginal or uterine bleeding in nonpregnant females are classified into structural and nonstructural causes, using the acronym: PALM-COEIN: **P**olyp, **A**denomyosis, **L**eiomyoma, **M**alignancy and hyperplasia, **C**oagulopathy, **O**vulatory dysfunction, **E**ndometrial, **I**atrogenic, and **N**ot otherwise classified.[2] Causes of bleeding based on age are shown in **Table 96-3**. The term *abnormal uterine bleeding* encompasses all causes of abnormal bleeding in nonpregnant women, and the most likely causes are largely determined by patient age. Because the first clinical signs of heavy menstrual bleeding (heavy uterine bleeding) are noted after the onset of menses during early adolescence, structural causes are uncommon. Anovulatory and bleeding disorders are most common during this time period (ages 13 to 19). **Pregnancy-related complications become the most common cause of abnormal vaginal bleeding during the reproductive years.** Issues regarding pregnancy are covered in chapters 98, "Ectopic Pregnancy and Emergencies in the First 20 Weeks of Pregnancy" and 100, "Maternal Emergencies after 20 Weeks of Pregnancy and in the Postpartum Period."

Abnormal uterine bleeding as a result of local structural pathology such as polyps and fibroids is not typically seen until women reach their

TABLE 96-2 Important Historical Elements in Uterine Bleeding

Category	Details
Reproductive history	Age of menarche Menstrual history Date of the last menstrual period Pattern of normal and abnormal bleeding or discharge Presence of dysmenorrhea
Sexual history	Current sexual activity Contraception Use of barrier protection Pregnant—yes/no? Gravida and para Previous abortion or recent termination History of ectopic pregnancy History of pelvic inflammatory disease, sexually transmitted diseases, human immunodeficiency virus, and hepatitis status
History of trauma	—
Possibility of retained foreign body	—
Medications, including alternative and complementary medicine	—
Past medical history	Signs and symptoms of coagulopathy, including nosebleeds, petechiae, and ecchymoses Endocrine disorders, including diabetes, pituitary tumors, polycystic ovary disease, hyperthyroidism, and hypothyroidism Liver disease
Associated symptoms	Urinary, GI, musculoskeletal symptoms; fever or syncope

mid 30s. Perimenopausal anovulatory bleeding is typically seen in the mid to late 40s. Postmenopausal bleeding is often related to atrophic vaginitis, exogenous hormones, and malignancy. A summary of the causes by age is provided in **Table 96-3**.

STRUCTURAL CAUSES OF VAGINAL BLEEDING

POLYPS

Endometrial and endocervical polyps are epithelial proliferations that most often are benign. Although most polyps are asymptomatic, polyps can be a cause of abnormal uterine bleeding in women older than 35 years. A common symptom is intermenstrual bleeding, and diagnosis is made on hysteroscopy.

ADENOMYOSIS

Adenomyosis is the presence of endometrial glands and stroma within the myometrium. The histopathology is often diffuse within the uterus, but localized areas of growth are called adenomyomas. Symptoms include painful, heavy periods most commonly seen in the fourth and fifth decade of life. ED management is aimed at symptomatic treatment, analgesics, and evaluation for anemia. Leuprolide acetate (Lupron), a gonadotropin-releasing hormone analog plus add-back therapy, or a levonorgestrel intrauterine device (Mirena) for 6 months may be initiated as an oupatient.[3] MRI is the imaging modality of choice, but US is a good alternative. Patients with severe bleeding unresponsive to medical management often require surgical management.

LEIOMYOMAS

Uterine fibroids (also called leiomyoma or myoma) are the most common benign tumors of the pelvis in women; an estimated 25% of white women and 50% of black women have fibroids in their reproductive years. This number increases with age. The cause is unclear, but fibroid growth is dependent on genetic factors and hormones: gonadotropin-releasing hormone, estrogen, and progestin. Leiomyomas decrease in size during menopause. In some cases, fibroids will enlarge early in pregnancy and with oral contraceptive pill use. Most fibroids are asymptomatic, but up to 30% of patients with leiomyomas experience pelvic pain and abnormal bleeding. Acute pain is rare, but severe pain may be experienced with torsion or degeneration. Degeneration results from rapid growth and loss of blood supply, often seen during early pregnancy. A rare case of spontaneous fibroid rupture causing massive intra-abdominal hemorrhage has been reported in the literature.[4]

Signs and symptoms of fibroids vary depending on fibroid size and location. Large fibroids may be palpated on abdominal or rectal exam. Symptoms of acute degeneration include tenderness, rebound guarding, fever, and elevated WBC count. Pedunculated subserosal leiomyomas may undergo torsion or cause uterine cramping. Rapid growth at any age or growth after menopause is highly suspicious for malignant transformation. The best diagnostic test is ultrasonography and is as sensitive as MRI.

The management of uterine fibroids depends on the severity and duration of symptoms. In the ED, management is focused on treating complications associated with fibroids. Iron deficiency anemia is often long-standing and may require a blood transfusion. Other complications are rarer, but constipation, urinary retention, vaginal or intraperitoneal hemorrhage, deep vein thrombosis, and mesenteric thrombosis have been reported.[5] Nonsteroidal anti-inflammatory drugs (NSAIDs) are the mainstays for analgesia in the ED. Medical management with hormonal agents may be initiated in the ED with gynecologic consultation. Intrauterine fibroids are treated surgically with hysteroscopy. Surgical removal is associated with a 25% to 30% rate of recurrence and significant bleeding complications. Uterine artery embolization is an effective treatment for symptomatic fibroids, resulting in decreased fibroid volume and alleviation of symptoms.[6-8]

MALIGNANCY

Any malignancy of the genital tract, in particular endometrial or cervical cancer, may produce bleeding. **Consider endometrial hyperplasia or endometrial cancer in women >45 years old or in younger women**

TABLE 96-3 Causes of Bleeding by Age Group*

Adolescent	Reproductive	Perimenopausal	Postmenopausal
Anovulation (hypothalamic-pituitary-ovarian immaturity)	Pregnancy	Anovulation	Atrophic vaginitis (30%)
Pregnancy	Anovulation (PCOS)	Uterine leiomyomas	Exogenous hormone use (30%)
Exogenous hormones or OCP	Exogenous hormone use or OCP	Cervical and endometrial polyps	Endometrial lesions, including cancer (30%)
Coagulopathy	Uterine leiomyomas	Thyroid dysfunction	Other tumor—vulvar, vaginal, cervical (10%)
Pelvic infections	Cervical and endometrial polyps		
	Thyroid dysfunction		

Abbreviations: OCP = oral contraceptive pill; PCOS = polycystic ovary syndrome.

*Prepubertal bleeding is discussed in chapter 133, "Pediatric Urologic and Gynecologic Disorders."

TABLE 96-4 Factors Frequently Used to Determine the Cause of Abnormal Bleeding in Perimenopausal Women

	Cause of Bleeding					
Distinguishing Features	Perimenopause	Neoplasia	Fibroid	Adenomyosis	Polyp	Pregnancy Related
History						
Associated hot flashes	Yes	No	No	No	No	No
Increased cramping	No	Sometimes	Sometimes	Yes	No	Sometimes
Bleeding pattern						
Skips and misses	Yes	Possible	No	No	No	—
Amenorrhea	Yes	No	No	No	No	Yes
Regular but shorter interval	Yes	No	No	No	No	No
Regular but heavy	No	No	Yes	Yes	Yes	No
Irregular	Yes	Possible	No	No	Yes	Yes
Physical examination						
Enlarged uterus	No	Sometimes	Yes	Yes	No	Yes
Enlarged and tender uterus	No	No	No	Yes	No	Possible
Ultrasonography						
Enlarged uterus	No	No	Yes	Yes	No	No
Enlarged uterus with intrauterine mass	No	Yes	Sometimes	No	Yes	Yes
Laboratory tests						
Follicle-stimulating hormone	Elevated	Normal	Normal	Normal	Normal	Normal
Complete blood count	Usually normal	Normal/low	Normal/low	Normal/low	Normal/low	Normal/low
Human chorionic gonadotropin	Negative	Negative	Negative	Negative	Negative	Positive

with other risk factors.[1,9,10] The amount of bleeding does not correlate with the severity of disease. Elderly patients may not be able to accurately describe the location of pain or bleeding in the proximity of the bladder, uterus, or rectosigmoid. Therefore, make sure to adequately visualize the vagina and cervix on pelvic examination.

All patients with postmenopausal bleeding warrant prompt referral for evaluation. Outpatient US and endometrial biopsy should be arranged for stable patients.

Vaginal bleeding, especially when seen in conjunction with atrophic vaginitis, may be associated with the use of pessaries and douche solutions, which can irritate the mucosa. Cervical polyps can also cause vaginal bleeding. However, an endometrial biopsy is ultimately required to rule out other serious causes of bleeding (**Table 96-4**).

NONSTRUCTURAL CAUSES OF VAGINAL BLEEDING

Consider these causes in the differential diagnosis by methodical history and physical examination. Pursue as needed with further investigations and consultations.

COAGULOPATHIES

Primary coagulation disorders account for 5% to 20% of acute uterine bleeding in adolescents.[11,12] von Willebrand's disease is the most common cause, but myeloproliferative disorders and immune thrombocytopenia also may be diagnosed. In adults, bleeding may result from anticoagulation agents or acquired bleeding disorders. Cirrhosis may lead to bleeding secondary to reduced capacity of the liver to metabolize estrogens.

OVULATORY DYSFUNCTION

Acute uterine bleeding secondary to anovulation is seen in 10% to 15% of gynecologic patients. Signs include irregular and/or heavy menstruation. Ovulatory dysfunction is common in perimenarchal and perimenopausal women, as well as in patients with endocrine disorders, polycystic ovary syndrome, exogenous hormone use, and liver or renal disease.

Anovulatory uterine bleeding in adolescence is due to the immature hypothalamic-pituitary-ovarian axis. In this situation, the amount of bleeding is usually minimal and painless. Dilatation and curettage (D&C) is rarely required. Severe anemia from heavy menstrual bleeding in early adolescence should prompt evaluation for bleeding disorders (e.g., von Willebrand's disease, factor VIII deficiency). **Table 96-5** outlines the medical management of acute uterine bleeding from ovulatory dysfunction in the ED.

Anovulatory bleeding in the reproductive-age female may be regular in timing but more often is irregular because of fluctuating estrogen levels below the critical level required to maintain endometrial growth. The level of estrogen depends on the age, number, and activity of ovarian follicles. As some follicles degenerate, others resume the production of estrogen, and the endometrium continues to proliferate for weeks to

TABLE 96-5 Treatment of Acute Uterine Bleeding from Ovulatory Dysfunction

Drug	Suggested dose	Dose Schedule	Potential Contraindications
Conjugated equine estrogen (Premarin)	25 milligrams IV	Every 4–6 h for 24 h	Breast cancer, liver disease, VTE*
Combined oral contraceptives (e.g., Sprintec®, 0.25 milligram of norgestimate and 0.035 milligram of ethinyl estradiol)	Monophasic† combined OCP that contains at least 35 micrograms of ethinyl estradiol	Three times per day for 7 d	Smokers >35 y, HTN, VTE, CVA, breast cancer, liver disease, thromboembolic disorders, diabetes with vascular disease, heart disease, major surgery with immobilization
Medroxyprogesterone acetate (Provera)	20 milligrams orally	Three times per day for 7 d	VTE, liver disease, breast cancer

Abbreviations: CVA = cerebrovascular accident; HTN = hypertension; OCP = oral contraceptive pill; VTE = venous thromboembolism (including deep venous thrombosis and pulmonary embolism).

*Caution in patients with cardiovascular or thromboembolic risk factors.

†Monophasic delivers the same amount of estrogen and progestin every day.

months, which may cause glandular hyperplasia ("Swiss cheese" hyperplasia). The estrogen steady-state is insufficient to meet the growing needs of the endometrium and produces a relative estrogen insufficiency, and uterine bleeding ensues. Alternatively, when follicle degeneration and stimulation are not balanced, absolute estrogen levels fall, and withdrawal bleeding occurs. Characteristically, anovulatory cycles present as prolonged amenorrhea with periodic menorrhagia. Because of the lack of progesterone-mediated myometrial contractions and arteriolar vasospasm, anovulatory cycles are rarely associated with cramping. This pattern of bleeding increases the risk of endometrial hyperplasia and adenocarcinoma.

Hypothyroidism may be associated with heavy uterine bleeding or intermenstrual bleeding from ovulatory dysfunction, with an estimated incidence of 0.3% to 2.5%.[13] Eating disorders, excessive weight loss, stress, and exercise can also cause abnormal uterine bleeding. Obtain levels of thyroid-stimulating hormone in women with uterine bleeding of undetermined origin or in those with thyroid nodule or goiter.

ENDOMETRIAL CAUSES

Acute uterine bleeding that occurs in the context of normal ovulation and with a structurally normal endometrial cavity is attributed to endometrial causes. Normal ovulation is based on a history of predictable, cyclical menstrual periods. Bleeding may be preceded by breast tenderness, abdominal bloating, and pelvic pain. The diagnosis is made when patients have heavy menstrual bleeding with no other identifiable abnormalities.

Ovulatory bleeding is generally treated with oral contraceptives, NSAIDs, or progestins. Endometrial ablation may be useful for those who do not respond to medical therapy; hysterectomy is reserved for those who fail medical management and have excessive blood loss.

IATROGENIC CAUSES

Oral contraceptive pill (OCP) use remains the most common cause of intermenstrual bleeding. Additionally, medications (e.g., antiseizure medications) that increase the P450 system of the liver may increase the metabolism of endogenous hormonal glucocorticoids and may cause withdrawal bleeding.

Hormone replacement therapy, which can relieve symptoms associated with menopause, may also be associated with vaginal bleeding. Hormone replacement therapy for this purpose has been called into question, as there is no clear benefit for primary and secondary prevention of cardiovascular disease, and excessive risk of endometrial, breast, and colorectal cancer and thromboembolism has been noted.[14-16]

Forty percent of women receiving continuous OCP therapy will experience abnormal bleeding in the initial 4 to 6 months. Bleeding after 6 months of continuous combined hormone replacement therapy, unexpected bleeding with cyclic hormone replacement therapy, or bleeding that recurs after amenorrhea is established should prompt referral for evaluation. There are no acceptable criteria for "abnormal bleeding" on these therapies. The most common etiologies for bleeding while on hormone replacement therapy are poor compliance, poor GI absorption, drug interactions, failure to synchronize therapy with endogenous ovarian activity, and coagulation disorders.

OTHER CAUSES OF VAGINAL BLEEDING

Pelvic inflammatory disease or infections that cause endometritis can cause abnormal vaginal bleeding. Cervical erosions, polyps, and cervicitis may cause bleeding from the cervix. Vaginal infections, trauma, and foreign bodies may also present with abnormal bleeding. Emergency therapy should be directed at investigating and treating obvious causes of bleeding. For further details, see chapters 103, "Pelvic Inflammatory Disease" and 102, "Vulvovaginitis."

LABORATORY EVALUATION AND IMAGING

Obtain a pregnancy test in women of childbearing age (except those with hysterectomy) to rule out pregnancy as a cause of bleeding. A CBC identifies anemia. Obtain coagulation studies only when indicated by history or physical examination. In individuals with suspected endocrine disorders, determination of thyroid-stimulating hormone and prolactin levels may be helpful, but the levels may not be available for ED evaluation.

Ultrasonography is the first-line imaging modality for gynecologic conditions such as vaginal bleeding, adnexal or uterine masses, or pelvic pain. US can determine uterine size and endometrial characteristics and can identify the presence of leiomyoma, ovarian cysts, hydrosalpinx, pelvic adhesions, tubo-ovarian abscesses, endometriosis, and tumors. Transvaginal ultrasonography further delineates ovarian cysts and fluid in the cul-de-sac. Depending on the degree of pain and findings on physical examination, US can be done on an emergency basis or deferred for outpatient evaluation.

CT is used primarily in the ED for the evaluation of acute abdominal or pelvic pain (see chapter 97, "Abdominal and Pelvic Pain in the Nonpregnant Female"). MRI is used primarily for cancer staging and is rarely indicated during ED evaluation. The National Guideline Clearinghouse has published guidelines for radiology for abnormal vaginal bleeding.[17]

TREATMENT

ACUTE UTERINE BLEEDING

Patients who are hemodynamically unstable need immediate resuscitation and emergent gynecologic consultation (**Figure 96-2**). Do not attempt vaginal packing, because it increases the risk of infection and may hide ongoing blood loss. In addition to fluid resuscitation, blood transfusion, and correction of underlying coagulopathies, assess for other potential causes of bleeding including trauma, bleeding dyscrasia, infection, and retained foreign bodies. The options for management of acute hemorrhage include hormonal, surgical, and hemostatic interventions.

Perimenopausal women with abnormal uterine bleeding should have an endometrial biopsy *before* the initiation of hormone replacement therapy. Otherwise, hormonal agents are first-line medical management for acute uterine bleeding in patients without an underlying bleeding disorder.[18,19] Short-term hormonal treatment allows the endometrium to stabilize and slows acute bleeding. Acute treatment options include intravenous estrogen and oral progestins (**Table 96-5**). For severe hemorrhage, give conjugated estrogen (Premarin) at a dose of 25 milligrams IV every 4 to 6 hours until bleeding stops, with ED observation, followed by an oral contraceptive. In women with a history of blood clot or cardiovascular disease, high-dose estrogen therapy is contraindicated. Progestin is used when there is concern for underlying endometrial pathology or hyperplasia. US finding may reveal a thickened endometrial strip, fibroids, or polyps.

Tranexamic acid, a lysine derivative that prevents fibrin degradation, is used primarily for intraoperative gynecologic bleeding.[20,21] Use depends on geography and institution, so obtain gynecologic consultation if administration is considered, especially to discuss risks and benefits. Clinical studies on the effectiveness of tranexamic acid have excluded patients with potential for thrombosis.

HEAVY MENSTRUAL BLEEDING

Heavy menstrual bleeding is treated with NSAIDs and combined or progestin-only oral contraceptives. Progesterone works by decreases the number of available estrogen receptors and stabilizing the endometrium. Common side effects of this regimen include nausea and vomiting. One recent report recommended IM depot-medroxyprogesterone combined with a short 3-day oral course of an oral contraceptive; the mean time for bleeding cessation was 2.6 days, and all patients stopped bleeding within 5 days.[22] Simplified ED regimens for combined OCPs and progestin-only pills are outlined in Table 96-5. The median time to stop bleeding for either regimen (combined OCP or progestin-only regimen) is 3 days. However, multiple different hormonal doses and schedules are also effective. In general, for young healthy women where bleeding is often related to anovulation and there is no concern for endometrial pathology, then OCPs are favored. For older patients, or obese/perimenopausal patients where there could be concern for endometrial pathology, then progestin-only is preferred.

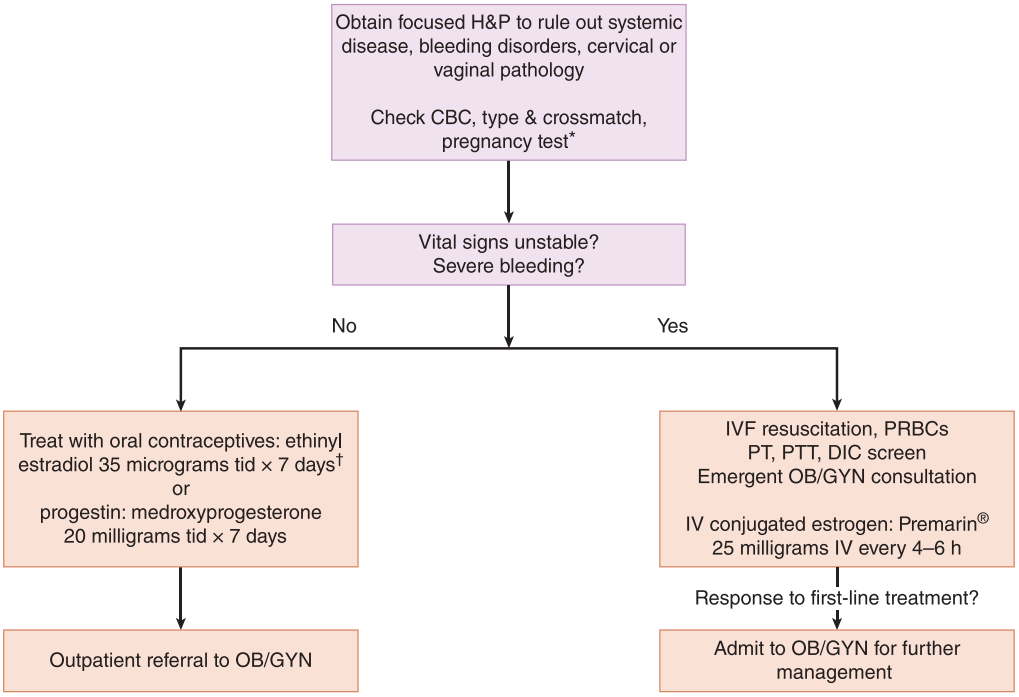

FIGURE 96-2. Algorithm for ED evaluation and treatment of acute vaginal bleeding (**Also see Table 96-5 for more detail.**). *Consider other laboratory tests if positive screen for suspected bleeding disorders based on history and physical (H&P). †Contraindications to hormonal agents need to be considered before administration. Other oral contraceptive and progestin formulations and dose schedules may be equally effective. DIC = disseminated intravascular coagulation; IVF = IV fluid; OB/GYN = obstetrician/gynecologist; PRBCs = packed red blood cells; PT = prothrombin time; PTT = partial thromboplastin time.

DISPOSITION AND FOLLOW UP

Stable patients can be discharged home with arrangements for prompt follow-up within 1 week.

The need for surgical management is based on clinical stability. If medical management fails or if there is a contraindication (e.g., thromboembolic disease), then surgical management is the next step. Surgical options are directed by suspected etiology and include dilatation and curettage, hysteroscopy, endometrial balloon tamponade, and uterine artery embolization. Hysterectomy is used as a last resort in patients with acute life-threatening bleeding unresponsive to other treatment measures.

Provide referral for endometrial biopsy for patients at risk for endometrial cancer and all women >45 years old. Perimenopausal bleeding is associated with malignancy in 10% of women. Risk factors include obesity, nulliparity, history of anovulation, tamoxifen use, infertility, and a family history of endometrial or colon cancer. Other diagnostic procedures performed at follow-up may include sonohysterography, hysterosalpingography, and hysteroscopy with directed biopsy and dilatation and curettage.[23]

LONG TERM MANAGEMENT

It is essential to establish a definitive diagnosis before initiating long-term management. Expectant management is appropriate if episodes of heavy or irregular bleeding are infrequent. Several choices for long-term medical management of heavy menstrual bleeding exist. Overall, there is insufficient evidence to define an optimal medical management strategy.[24,25]

OCPs have long been an excellent choice for adolescents and women requiring contraception. Heavy menstrual bleeding is decreased by 50%, with a similar reduction in the degree of pain associated with bleeding. However, a recent systemic review found levonorgestrel intrauterine device (71% to 95% reduction) superior to combined OCPs (35% to 69% reduction) and NSAIDs (10% to 52% reduction).[26]

NSAIDs are effective in reducing pain and blood loss in 20% to 50% of women with abnormal uterine bleeding secondary to ovulatory dysfunction.[27] NSAIDs should be started on the first day of the period and continued until bleeding stops and pain resolves.

All NSAIDs inhibit cyclooxygenase in the arachidonic acid cascade. Prostaglandin inhibitors alter the ratio of prostaglandin $F_2\alpha$, which causes vasoconstriction, to prostaglandin E_2, which causes vasodilation. NSAIDs also increase levels of thromboxane A_2, which causes vasoconstriction and increases platelet aggregation. NSAIDs have a mild side effect profile and are inexpensive. Treatment choices include mefenamic acid, 500 milligrams three times a day PO, naproxen, 500 milligrams twice per day PO, and ibuprofen, 400 milligrams every 6 hours. Any of these may be administered to reduce bleeding and pain associated with use of an intrauterine device.[28] NSAIDs are less useful in patients with uterine leiomyomas.

Additional long-term treatment options that may be prescribed at follow-up include clomiphene citrate, medroxyprogesterone acetate, gonadotropin-releasing hormone agonists, and tranexamic acid. Clomiphene citrate may be used to decrease bleeding as well as to induce ovulation if pregnancy is desired. If there is no contraindication to progestin usage, medroxyprogesterone acetate, 10 milligrams daily PO for 10 days, can be used to produce scheduled bleeding. Intrauterine progesterone release is a highly effective treatment option. Patients may still ovulate when using this medication. Gonadotropin-releasing hormone agonists may be used to induce amenorrhea, but women on this therapy become menopausal. Other drawbacks include medication expense and bone loss when used for >6 months. Tranexamic acid, a fibrinolytic, reduces vaginal bleeding with minimal side effects. An improved quality of life in patients using tranexamic acid when compared with hormone therapy and NSAIDS has been reported.[29]

Nonmedical invasive management strategies may be required if medical treatment fails. These include hysteroscopy, endometrial ablation, or myomectomy. Hysteroscopy can be used to sample the endometrium and resect polyps and myoma. Endometrial ablation may be performed in patients who do not desire fertility, have no pathologic diagnosis, and for whom medical therapy has failed.[30] Myomectomy may be useful in patients with symptomatic fibroids. Hysterectomy is reserved for selected patient populations. Uterine artery embolization is an effective nonsurgical option for the management of bleeding caused by fibroids.[31]

SPECIAL POPULATIONS

GENITAL TRAUMA

Vaginal injuries after intercourse are not uncommon. The majority of coital injuries result from vigorous voluntary sexual activity, although violent involuntary sexual activity should be considered. The most common site of injury is the posterior vaginal fornix. Misdiagnosis of coital injuries occurs frequently because either the physician fails to take an adequate history or the patient does not admit to antecedent sexual activity. Most coital injuries are minor, but severe injuries may lead to hemorrhagic shock.

BLOOD DYSCRASIAS

Bleeding disorders may become apparent with an initial presentation of abnormal menstrual bleeding. Uterine hemostasis is not well understood, and any disorder of blood vessels, platelet abnormalities, and coagulation disorders, including von Willebrand's disease, may result in excessive menstrual bleeding. Of historical interest, the first described case of von Willebrand's disease was in a 13-year-old who died as a result of uncontrollable uterine bleeding.[32] Abnormal uterine bleeding is present in the majority of women with von Willebrand's disease or factor XI deficiency and in carriers of hemophilia.

A multidisciplinary approach is recommended. Initial treatment options are similar to those without bleeding disorder: antifibrinolytics, OCPs, and levonorgestrel intrauterine device. Hormonal agents raise factor VIII and von Willebrand factor levels and are an effective and popular form of therapy. Antifibrinolytics, such as tranexamic acid, reduce both plasminogen activator activity and plasmin activity. Desmopressin acetate (DDAVP) stimulates endogenous release of factor VIII and von Willebrand factor and may be used prophylactically for minor procedures or treatment of bleeding episodes and heavy menstrual bleeding. Desmopressin acetate is administered intranasally, parenterally, or by SC injection. The blood of patients with von Willebrand's disease must be typed and screened for antibodies before instituting desmopressin acetate because it may induce thrombocytopenia in certain subgroups. NSAIDs are ineffective in decreasing uterine bleeding and may increase blood loss in this population.

POLYCYSTIC OVARY SYNDROME

Polycystic ovary syndrome, one of the most common endocrine disorders, is the association of hyperandrogenism and anovulation without underlying disease of the adrenal or pituitary glands.[33] A triad of obesity, hirsutism, and oligomenorrhea is classically described, although obesity is not universally seen. When menses occurs, it is heavy and prolonged. The syndrome is further characterized by acne, androgen-dependent alopecia, elevated serum concentrations of androgens, hyperinsulinemia, and hypersecretion of luteinizing hormone with a normal or low follicle-stimulating hormone level. Typical ovarian morphology, which may be seen by US, is not necessary for the diagnosis and may, in fact, represent a response of the ovary to chronic anovulation. The differential diagnosis includes hyperprolactinemia, acromegaly, congenital adrenal hyperplasia, and androgen-secreting tumors of the ovary or adrenal gland. Management of menorrhagia in women who do not desire fertility includes low-dose oral contraceptives or cyclic progestin administration.

HUMAN IMMUNODEFICIENCY VIRUS

In general, there is no need to change the approach to vaginal bleeding in human immunodeficiency virus–positive women. Look for associated infections and complications of chronic illness. The rate of vaginal and pelvic infections and cervical dysplasia is high in this cohort of patients. In a cross-sectional survey of 386 women <50 years old, with and without human immunodeficiency virus, neither infection nor immunosuppression affected menstruation or the rate of abnormal vaginal bleeding.[34] This was also seen in a study of 85 seropositive women, although the power of the study was low.[35]

STRESS, ILLNESS, AND RAPID WEIGHT CHANGE

Periods of physical or psychological stress, illness, malnutrition, rapid weight gain or loss, and intense physical regimens affect the hypothalamus and disrupt the normal pattern of gonadotropin release. This usually causes amenorrhea but may result in irregular, heavy bleeding. In obese women, menorrhagia may be a result of increased circulating levels of estrogen from peripheral conversion of androstenedione to estrone in fatty tissue. Patients with liver and renal disease may also develop irregular bleeding.

REFERENCES

The complete reference list is available online at www.TintinalliEM.com.

CHAPTER 97

Abdominal and Pelvic Pain in the Nonpregnant Female

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INTRODUCTION AND EPIDEMIOLOGY

This chapter reviews diagnosis and treatment of abdominal and pelvic pain in nonpregnant women. Even after the possibility of pregnancy is eliminated, abdominal pain in women remains a challenging diagnosis because of physical proximity and overlapping spinal segment innervation and similar symptoms of GI, urologic, and gynecologic organ systems. Discussion of the pregnant woman with abdominal/pelvic pain is found in chapters 100, "Maternal Emergencies after 20 Weeks of Pregnancy and in the Postpartum Period," 103, "Pelvic Inflammatory Disease," and 71, "Acute Abdominal Pain."

CLINICAL FEATURES

HISTORY

Define characteristics of the pain including onset, duration, location, quality, radiation, and exacerbating and alleviating factors. History should include questions about GI symptoms (nausea, vomiting, diarrhea, and constipation), urologic symptoms (dysuria, hematuria, frequency, and urgency), and gynecologic symptoms (vaginal bleeding, discharge, dyspareunia, and menstrual history). **History of sexual activity and menstrual history should never be relied upon to exclude pregnancy.** Obtain past medical, surgical, and family history, as well as details of prior pregnancies and outcomes. Active lactation and medication use, including specific methods of birth control, should be part of the history. Ask about infertility treatments because ovulation-inducing treatments increase risk of ovarian torsion, cysts, and ovarian hyperstimulation syndrome. When obtaining a sexual history and social history, it is wise to interview the patient alone, which may help patients feel more comfortable discussing potentially sensitive or embarrassing topics. Ask about pelvic inflammatory disease risk factors including unprotected intercourse, prior sexually transmitted infections, and multiple sexual partners. While the patient is alone, ask her about safety at home, and assess for any potential abusive situations. Patients with history of physical and sexual abuse may develop a variety of somatic complaints including abdominal and pelvic pain, and this pain is often chronic in nature. Social history should include living situation, occupation, and personal habits (use of tobacco, alcohol, and drugs).

PHYSICAL EXAMINATION

A standard head-to-toe systematic approach beginning with vital signs is essential. The patient should be adequately undressed for a careful examination. In focusing on the examination of the abdomen, it is helpful to determine in what quadrant(s) of the abdomen the pain is located; this may help to narrow the differential diagnosis (**Figure 97-1**).

In addition to palpating for tenderness or masses, evaluate for surgical scars, rashes, bruising, or ascites. Peritoneal signs may be less obvious in