CHAPTER 98

Selected Gynecologic Disorders

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PERSPECTIVE

Many women present to the emergency department (ED) complaining of either pelvic pain or vaginal bleeding. After the possibility of pregnancy has been eliminated, a primary goal of the ED evaluation is to recognize the presence of a few conditions, such as adnexal torsion, that warrant urgent intervention and others, such as new postmenopausal uterine bleeding, that require reliable outpatient follow-up. Most patients also benefit from relief of symptoms and reassurance.

This chapter specifically addresses the ED management of adnexal torsion, ovarian cysts, abnormal uterine bleeding and the provision of emergency contraception. Vaginal bleeding and pelvic pain in pregnant patients and gynecologic infections are discussed in other chapters.

ADNEXAL TORSION

Principles of Disease

Adnexal torsion accounts for roughly 3% of gynecologic emergencies.[1] Adnexal torsion can occur in young girls[2] and is increasingly recognized as a cause of pelvic pain in postmenopausal women but is still most common in the reproductive years because of the regular development of a corpus luteal cyst during the menstrual cycle.[3] Adnexal torsion is caused by a twisting typically of both the ovary and the fallopian tube on its vascular pedicle.[4] Many cases of torsion (50 to 80%) are associated with an ovarian tumor, typically a benign neoplasm, or with large, heavy cysts, as seen in ovarian hyperstimulation syndrome after in vitro fertilization, or polycystic ovaries.[1] Torsion may be a complication of pregnancy.[5,6] Torsion of a normal ovary only rarely occurs.[7] A slight predominance of ovarian torsion on the right side has been noted. The reason for this predilection is unclear but may relate to the stabilizing effect of the sigmoid colon on the left side.[4] In adnexal torsion, venous and lymphatic obstruction occurs initially, with subsequent congestion and edema of the ovary, progressing to ischemia and necrosis, and eventual infarction of the ovary[1] (Fig. 98-1). Thrombosis of the ovarian vein and artery can occur as well. The ovary often is salvageable if the diagnosis is made before thrombosis occurs.[4] Because of the dual blood supply of the ovary from both the uterine and ovarian arteries, complete arterial obstruction is rare[7] (Fig. 98-2).

Clinical Features

Adnexal torsion often can be a challenging diagnosis to make, because the classic symptoms of severe, sharp unilateral abdominal pain and nausea may not be present.[5,6,8] The presence of known risk factors for adnexal torsion such as an ovarian mass or infertility treatments may suggest the diagnosis.[1] Because the presentation can be variable and often subtle, the diagnosis can be difficult to make. In 87 patients with surgically confirmed torsion, the diagnosis was missed on the first visit in almost one half of the patients. Patients reported pain from several hours to weeks in duration, and almost all had some pain on abdominal palpation. Nausea also was a symptom in many of the patients. Other series report similar findings.[2-4,6,8]

Diagnostic Strategies

Laboratory Tests. No specific laboratory tests are helpful in the evaluation of a patient for suspected adnexal torsion, except for a pregnancy test to exclude ectopic pregnancy. A small percentage of patients may have an elevated white blood cell count above 15,000/μL,[5] but this is not a reliable indicator of adnexal torsion.[5,8]

Imaging

Ultrasonography. Ultrasound examination is usually the initial imaging test in the evaluation of patients with pelvic pain suggestive of adnexal torsion.[7] Enlargement of the ovary is the most common ultrasound finding.[4] The ovary also may have an abnormal position relative to the uterus. Enlargement of an ovary with a heterogeneous stroma and small, peripherally displaced follicles is the classic ultrasound appearance of torsion but often is not seen[4] (Fig. 98-3). The ultrasound study may reveal a mass in the ovary or evidence of hemorrhage[9] (Fig. 98-4). Free pelvic fluid also may be seen.[7] Hemorrhagic cysts and non-neoplastic masses frequently are associated with torsion. These may have a fluid-filled cystic component, exhibit a complex pattern with debris and septations, or be visualized as a solid mass.[9] The characteristic appearance of torsion may be difficult to appreciate if the ovary is obscured by an associated mass.[7]

Doppler Ultrasound Exam. Doppler ultrasound findings are inconsistent in adnexal torsion.[7,10,11] Many cases of surgically proven torsion will have documented blood flow on Doppler exam, because the ovary has a dual blood supply from both the

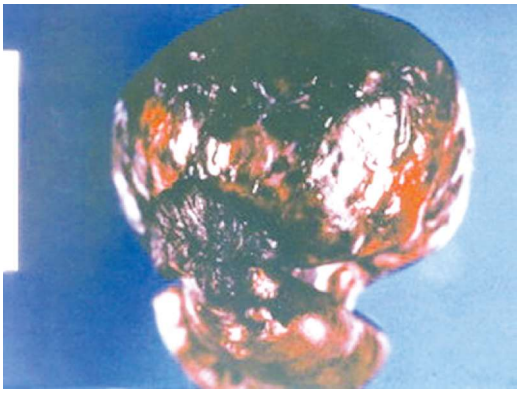

Figure 98-1. Pathology specimen demonstrating ovarian torsion. (From Andreotti RF, Shadinger L, Fleischer A: The sonographic diagnosis of ovarian torsion: Pearls and pitfalls. Ultrasound Clin 2:155, 2007.)

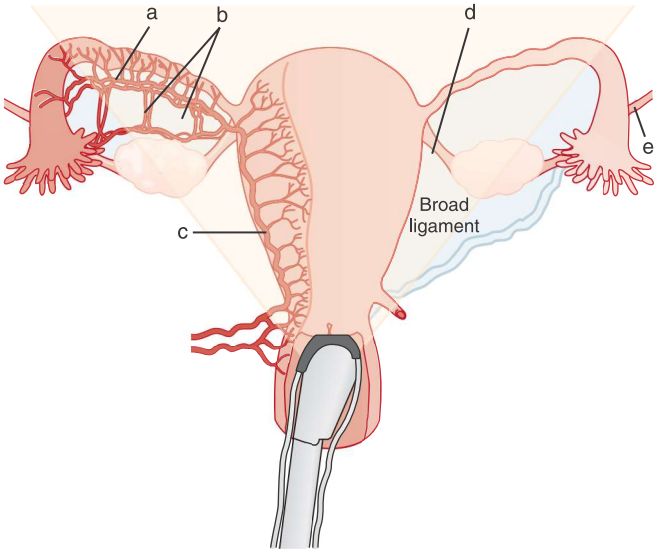

Figure 98-2. Ovarian blood supply: ovarian artery and vein (a), branching arterioles supplying ovary (b), utero-ovarian ligament (c), utero-ovarian ligament (d), infundibulo-pelvic ligament (e). (From Andreotti RF, Shadinger L, Fleischer A: The sonographic diagnosis of ovarian torsion: Pearls and pitfalls. Ultrasound Clin 2:155, 2007.)

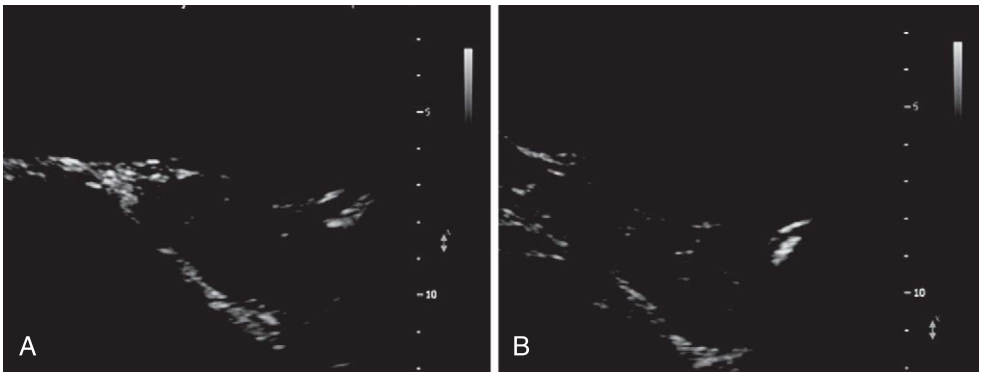

Figure 98-3. **A** and **B**, Ultrasound appearance of ovarian torsion in a prepubertal girl. (From Andreotti RF, Shadinger L, Fleischer A: The sonographic diagnosis of ovarian torsion: Pearls and pitfalls. Ultrasound Clin 2:155, 2007.)

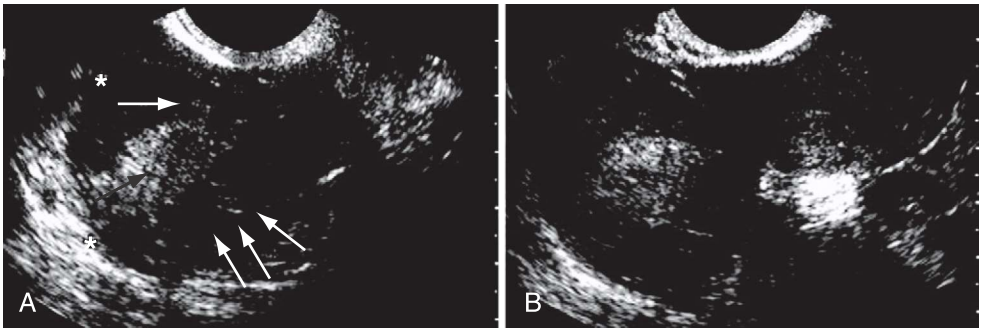

Figure 98-4. **A** and **B,** Intraovarian hemorrhage (*arrows* in **A**) in patient with ovarian torsion. (From Andreotti RF, Shadinger L, Fleischer A: The sonographic diagnosis of ovarian torsion: Pearls and pitfalls. Ultrasound Clin 2:155, 2007.)

ovarian and uterine arteries. Also, the torsion may be intermittent, so the findings may vary depending on the time of the exam.[7] If a large mass is present, the examination may be technically difficult to perform.[9] Despite these limitations, the Doppler exam may still be useful. Detection of abnormal venous flow is particularly important in early cases of torsion[10] (Fig. 98-5). Visualization of the twisting of the pedicle also is possible, and this image of the coiled vessels is referred to as a "whirlpool sign."[12] Lee and colleagues report an 88% accuracy for torsion when the twisted pedicle or whirlpool sign is visualized.[13]

Computed Tomography. When renal colic and appendicitis also are strong considerations in the differential diagnosis for acute pelvic pain, an abdominopelvic CT may be the best initial study, particularly in patients who have a presentation atypical for torsion. In ovarian torsion, CT findings include fallopian tube thickening, smooth wall thickening of the associated adnexal mass, ascites, and uterine deviation to the twisted side[14] (Fig. 98-6). Associated hemorrhage in patients with hemorrhagic infarction can be seen. A study of surgically confirmed ovarian torsion found that CT correctly diagnosed 5 of 13 cases (38%), as opposed to

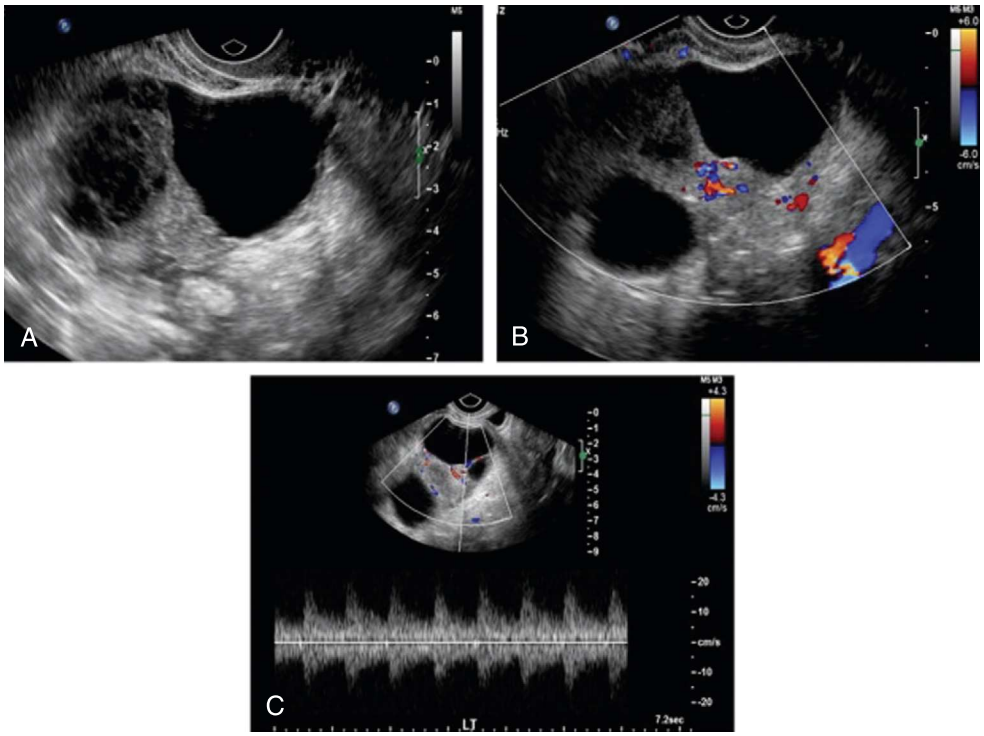

Figure 98-5. Arterial Doppler signal without venous signal in patient with surgically proven torsion. Ultrasound examination also demonstrated an associated hemorrhagic cyst. (From Andreotti RF, Shadinger L, Fleischer A: The sonographic diagnosis of ovarian torsion: Pearls and pitfalls. Ultrasound Clin 2:155, 2007.)

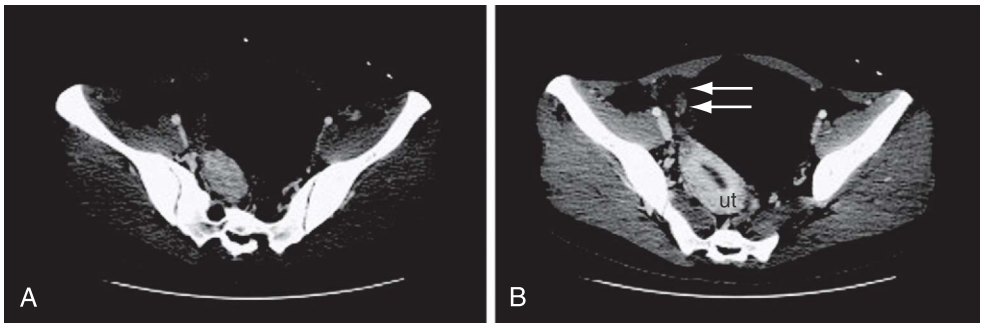

Figure 98-6. **A** and **B,** Computed tomography scans of the pelvis of a patient with ovarian torsion. Findings include a thickened fallopian tube, associated adnexal mass (*arrows* in **B**), and deviation of the uterus (ut) toward the twisted adnexa. (From Andreotti RF, Shadinger L, Fleischer A: The sonographic diagnosis of ovarian torsion: Pearls and pitfalls. Ultrasound Clin 2:155, 2007.)

ultrasonography, which correctly identified 15 of 21 cases (71%).[3] As illustrated by this and other studies, negative imaging findings should be interpreted with caution when clinical suspicion is high.

Magnetic Resonance Imaging. MRI is not typically ordered in the ED but also may demonstrate findings consistent with torsion. It is particularly helpful in cases in which the diagnosis is not clear, such as those characterized by intermittent pain over days.[15] Findings on MRI suggestive of torsion are similar to those on CT.[14] Table 98-1 lists the common imaging findings in ovarian torsion.

Laparascopy. A diagnostic laparoscopy is the gold standard investigative modality in patients in whom clinical suspicion is high despite negative imaging results. In 100 laparoscopies performed in nonpregnant patients with an acute abdomen, only 29 of the 66 cases of ovarian torsion were diagnosed preoperatively. Laparoscopy also diagnosed other unsuspected conditions including ovarian cysts, appendicitis, and pelvic inflammatory disease.[16]

Table 98-1 Imaging Characteristics of Ovarian Torsion

Ultrasonography
Enlargement of the ovary
Associated ovarian mass
Loss of enhancement
Edema
Free pelvic fluid
Loss of venous waveforms
Loss of arterial waveforms
Computed Tomography/Magnetic Resonance Imaging
Enlargement of the ovary
Associated ovarian mass
Thickening of the fallopian tube
Free pelvic fluid
Edema of the ovary
Deviation of the uterus to the affected side
Associated hemorrhage

Differential Considerations

Considerations in the differential diagnosis include other causes of acute lower abdominal pain such as appendicitis, ovarian cyst, urinary tract infection, renal calculi, pelvic inflammatory disease, diverticulitis, and ectopic pregnancy. A pregnancy test and pelvic imaging with either an ultrasound or a CT scan will usually allow distinction between these possibilities.

Management

Once the diagnosis of adnexal torsion is made, the patient should be taken to the operating room as soon as possible. Pediatric patients taken to surgery more than 24 hours later had a zero salvage rate, compared to patients who have the best chance for salvage, who were taken to the operating room within 8 hours.[17] The ovary often will recover even if black in appearance at the time of surgery because of its dual blood supply, so attempts at ovarian salvage are warranted even if the diagnosis is made late.[18] This is particularly true in adolescent patients. Return of ovarian function has been demonstrated in a majority of patients with surgery that saves the ovary.[17] Additional imaging studies, such as MRI, are an option if the diagnosis is not clear. Because torsion of a normal-appearing ovary is very rare, patients with a normal-appearing ovary on CT or ultrasound scan may be discharged from the ED.

OVARIAN CYSTS AND MASSES

Principles of Disease

Ovarian cysts are the most common gynecologic masses. They may manifest at any stage of life but are seen most frequently in the reproductive years because of the cyclic changes of the ovary associated with menstruation (Fig. 98-7). Most ovarian cysts are benign and resolve with no interventions; less commonly, however, they may either be malignant or associated with significant complications such as hemorrhage or torsion.

The most common type of cyst is a simple, follicular cyst. A follicular cyst develops normally during the first half of the menstrual cycle and is considered pathologic when it is greater than 2.5 cm in diameter. It is thin-walled and typically filled with clear fluid. A corpus luteum is considered to be a corpus luteal cyst when it attains a diameter greater than 3 cm. Several other types of cystic masses can occur in the ovary, including other types of cysts, non-neoplastic lesions such as benign cystic teratoma, and various types of ovarian malignancy.

Clinical Features

The most common presentation for patients with an ovarian cyst is pelvic pain. Rupture of a follicular cyst may produce transient pelvic pain or be associated with dyspareunia or may be asymptomatic. Because of its thin, fragile wall, a follicular cyst may rupture during sexual intercourse or during the pelvic exam.

Follicular cysts are rarely associated with hemorrhage. Presentation of a corpus luteal cyst may vary, ranging from an asymptomatic mass to dull, chronic pelvic pain to severe pain associated with rupture. Rupture of a corpus luteal cyst frequently is associated with a significant degree of hemorrhage. As with a follicular cyst, rupture may follow a pelvic exam, sexual intercourse, exercise, or trauma. Rupture of a large or complex cyst may result in severe pain and peritoneal signs, particularly if the associated bleeding is considerable. Occasionally, a large cyst may be discovered on a routine pelvic exam as an asymptomatic mass, but this is less common.

Diagnostic Strategies

Laboratory Tests. The initial step in the evaluation of pelvic pain or a pelvic mass is to exclude pregnancy with a urine or serum beta-human chorionic gonadotropin (β-hCG) test. A hematocrit may be valuable in the unstable patient as a marker of blood loss.

Imaging

Ultrasonography. Ultrasonography is the standard imaging modality to diagnose and characterize all ovarian pathologic processes and lesions including cysts and masses. Both transabdominal and endovaginal examinations provide useful information. The transabdominal approach permits an overall view of the pelvis and will visualize large masses and pelvic free fluid. Use of the endovaginal probe will provide a detailed picture of the ovary.[9] Figures 98-8 and 98-9 present endovaginal views of a normal ovary, and Figure 98-10 illustrates a simple cyst. Follicular cysts are part of the normal architecture of the ovary, but a cyst is considered to be pathologic if it is larger than 2.5 cm in diameter. Depending on the timing of the scan and the degree of clot formation and lysis, hemorrhage may be seen as well. Ultrasound findings suggestive of malignancy include internal septations, solid elements, internal echoes, daughter cysts, thickened wall, and large amounts of ascitic or free fluid.[9]

Computed Tomography. When considerations in the differential diagnosis of unilateral pelvic pain include renal colic, appendicitis, or other bowel pathology, a CT scan may be the best initial imaging study. CT scan also can demonstrate the

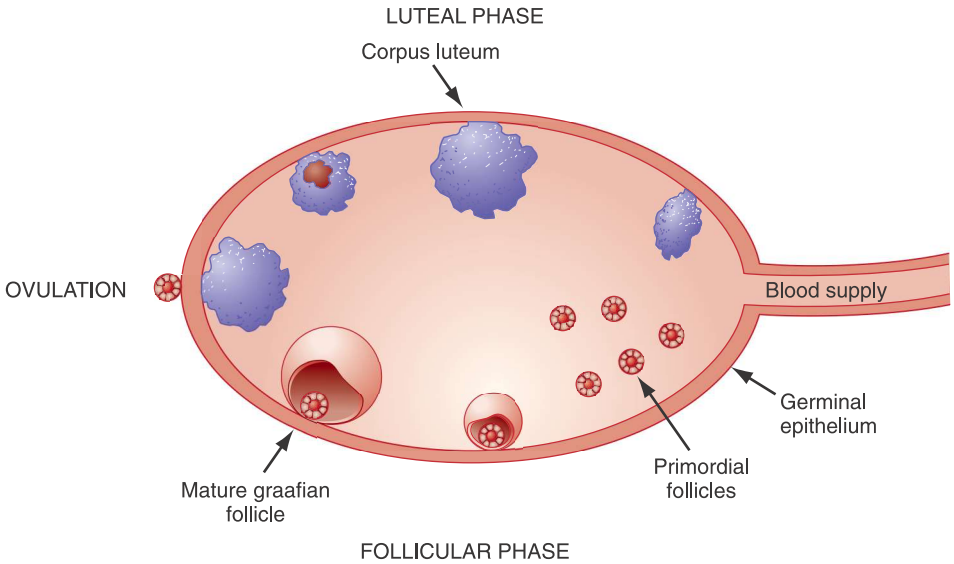

Figure 98-7. Ovarian function during the normal menstrual cycle. (From Lambert MJ, Villa M: Gynecologic ultrasound in emergency medicine. Emerg Med Clin North Am 22:683, 2004.)

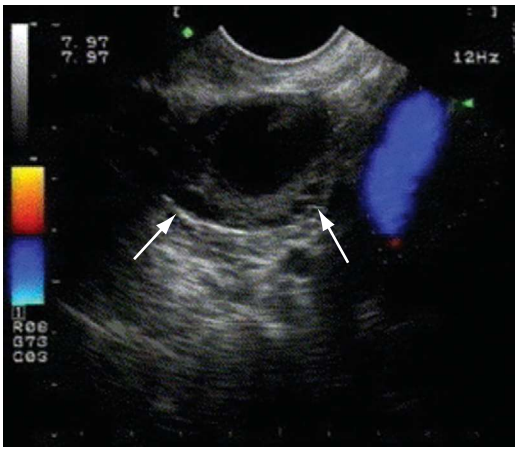

Figure 98-8. Endovaginal ultrasound image of a normal ovary with a dominant follicle *(arrows)*. (From Lambert MJ, Villa M: Gynecologic ultrasound in emergency medicine. Emerg Med Clin North Am 22:683, 2004.)

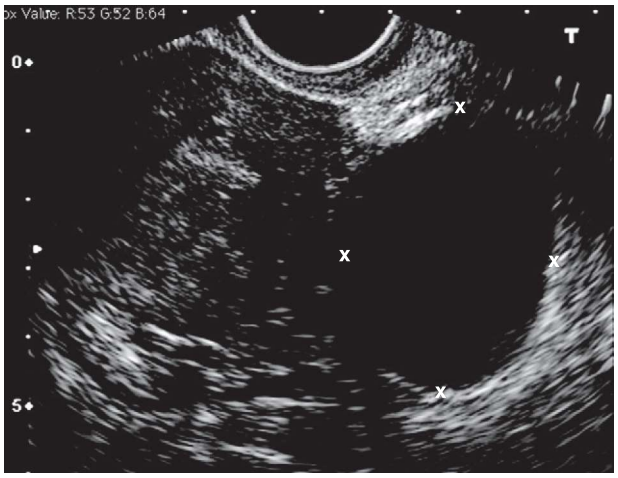

Figure 98-10. Simple ovarian cyst (within x's). (Courtesy of Robert Reardon, MD, Hennepin County Medical Center, Minneapolis, Minn; used with permission.)

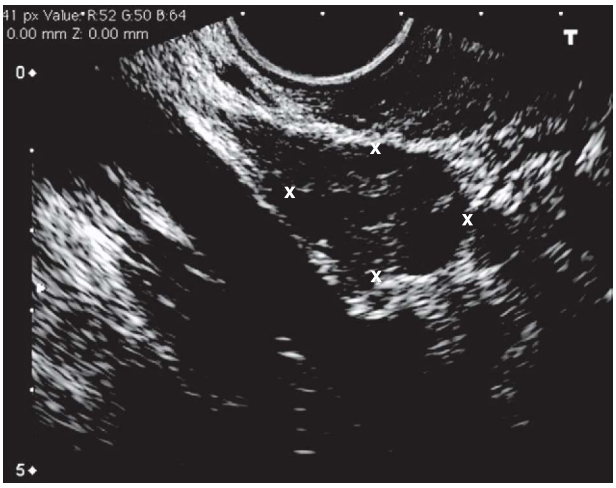

Figure 98-9. Endovaginal ultrasound image of a normal ovary (within x's). (Courtesy of Robert Reardon, MD, Hennepin County Medical Center, Minneapolis, Minn; used with permission.)

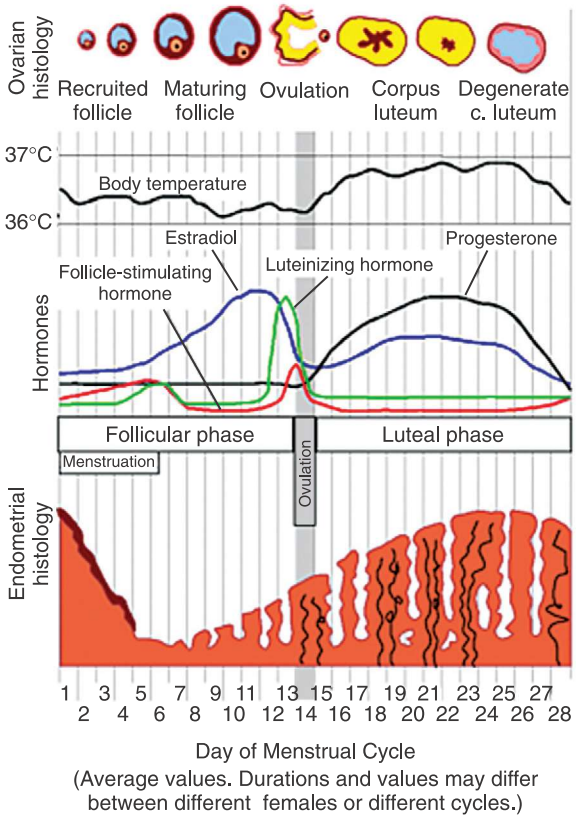

Figure 98-11. Normal menstrual cycle.

presence of a cyst and associated complications. A follow-up ultrasound exam may be useful in select cases after the CT scan is obtained, particularly if the cyst is complicated.

Differential Considerations

As with adnexal torsion, the differential diagnosis seeks to rule out other causes of pelvic pain such as ectopic pregnancy, pelvic inflammatory disease, urinary tract infections, renal colic, appendicitis, and diverticulitis. Cysts range from the benign to ovarian malignancies, so careful attention to the specific appearance of the cyst is important. Presence of large cysts or masses constitutes a risk factor for adnexal torsion.

Management

Patients with a simple cyst and reduction in their symptoms may be safely discharged with referral for outpatient gynecologic follow-up evaluation to ensure resolution of the cyst. Most uncomplicated, simple cysts will resolve within a month. More complex cysts may benefit from gynecology consultation in the ED, particularly if reliable follow-up is unlikely or if the patient is particularly symptomatic.

ABNORMAL UTERINE BLEEDING IN THE NONPREGNANT PATIENT

Principles of Disease

An understanding of the normal menstrual cycle is valuable in considering potential causes of abnormal uterine bleeding (Fig. 98-11). The menstrual cycle starts on the first day of

menses. During the first part of the menstrual cycle, the endometrium thickens under the influence of estrogen, and a dominant follicle develops in the ovary, releasing an ovum at the midpoint of the cycle. After ovulation, the luteal phase begins and is characterized by production of progesterone from the corpus luteum. Progesterone matures the lining of the uterus, and if implantation does not occur, the corpus luteum dies, accompanied by sharp drops in progesterone and estrogen. These changes typically are followed by menstruation. Menstrual bleeding typically is predictable and cyclic and results from withdrawal of the effects of hormones on the endometrium, which occurs approximately 14 days after ovulation.

Disruption of the hypothalamic-pituitary-ovarian axis from a variety of causes can result in abnormal uterine bleeding. Returning the balance of estrogen and progesterone closer to normal with oral contraceptives will help many patients regulate the cycle, with reduction in or cessation of abnormal uterine bleeding.[19-21]

Clinical Features

History. Abnormal uterine bleeding is a common presenting problem in the ED. Any of a large number of possible conditions can cause abnormal uterine bleeding, and a systematic history and physical exam can help narrow down the possibilities. Table 98-2 lists some terms frequently used to describe abnormal uterine bleeding.

Vaginal bleeding before the age of menarche is abnormal and is often the result of trauma, such as sexual abuse, or a structural lesion.[22] In a woman of reproductive age, abnormal uterine bleeding includes a change in the duration, frequency, or amount of bleeding, or bleeding between menstrual cycles. In the postmenopausal woman, any bleeding 12 months after the cessation of menses or unpredictable bleeding during hormone therapy should be considered abnormal. The amount and frequency of bleeding and the duration of symptoms, as well as the relationship to the menstrual cycle, should be established.[23] A menstrual cycle that is fewer than 21 days in duration or more than 35 days long or flow for less than 2 days or more than 7 days is classified as abnormal. The patient should be questioned about the possibility of pregnancy. A pattern of irregular bleeding between cycles or an abrupt change in the previous pattern of bleeding should be determined.[24] Systemic disease such as liver disease, diabetes, or thyroid disease may be associated with abnormal uterine bleeding.[25] Endometrial cancer is associated with underlying diabetes mellitus, anovulatory cycles, obesity, nulliparity, and age older than 35 years.[21] Cervical dysplasia or other genital tract pathology may cause postcoital or irregular bleeding.[26] Disruption along the hypothalamus-pituitary-ovarian pathway frequently is the cause of abnormal uterine bleeding. Causes of hypothalamic suppression include excessive exercise, stress, and weight loss.[27] Polycystic ovary syndrome (PCOS) results in excess estrogen production.

According to Dilley and colleagues, 10.7% of patients with heavy menstrual bleeding have an underlying coagulation disorder, the most common being von Willebrand's disease.[28] Although most patients with abnormal uterine bleeding do not require evaluation for coagulation disorder, the diagnosis is suggested by a family history of a bleeding disorder, prolonged history of heavy menses, excessive bleeding with surgery or dental procedures, or easy bruising.[29] Table 98-3 lists historical factors that can help suggest a potential cause for the bleeding.[21] *Dysfunctional uterine bleeding* is a diagnosis of exclusion in a woman of childbearing age after pregnancy, malignancy, and systemic disease have been ruled out.[21] Dysfunctional uterine bleeding typically is classified as anovulatory or ovulatory. Anovulatory bleeding is much more common, resulting from a disturbance of the normal hypothalamic-pituitary-ovarian axis, and is particularly common at the extremes of the reproductive years.[20]

Physical Exam. With prolonged, heavy bleeding, signs of chronic anemia may be noted on the physical exam. PCOS is a common cause of abnormal uterine bleeding. Physical findings suggestive of PCOS include obesity, acne, hirsutism, and acanthosis nigricans, which is hyperpigmentation typically

Table 98-2 Abnormal Uterine Bleeding

TERM	BLEEDING PATTERN
Menorrhagia	Bleeding occurring at regular intervals, but with heavy flow (≥80 ml) or duration (≥7 days)
Intermenstrual bleeding	Irregular bleeding between cycles
Amenorrhea	Bleeding absent for 6 months or more in a nonmenopausal woman
Midcycle spotting	Spotting occurring just before ovulation, typically from declining estrogen levels
Postmenopausal bleeding	Recurrence of bleeding in a menopausal woman at least 1 year after cessation of cycles
Acute emergent abnormal uterine bleeding	Bleeding characterized by significant blood loss that results in hypovolemic shock
Dysfunctional uterine bleeding	Ovulatory or anovulatory bleeding, diagnosed after the exclusion of pregnancy, medications, iatrogenic causes, genital tract pathology, and systemic disease

Table 98-3 Differential Diagnosis for Abnormal Uterine Bleeding

- Pregnancy and pregnancy-related conditions
  - Miscarriage
  - Ectopic pregnancy
  - Placenta previa
  - Placental abruption
  - Trophoblastic disease
- Medications/iatrogenic causes
  - Anticoagulants
  - Oral contraceptives
  - Steroids
  - Antipsychotics
  - Intrauterine devices
  - Thyroid hormone replacement
- Systemic disease
  - Cushing's disease
  - Coagulopathies
  - Liver or renal disease
  - Hypothalamic suppression (excessive exercise, weight loss)
  - Polycystic ovary syndrome
  - Thyroid disease
- Genital tract pathology
  - Cervicitis
  - Endometritis
  - Fibroids (leiomyomata)
  - Adenomyosis
  - Malignancy
  - Trauma
  - Foreign body
- Dysfunctional uterine bleeding

Figure 98-12. Longitudinal view of the uterus with thickened endometrium. (Courtesy of Robert Reardon, MD, Hennepin County Medical Center; used with permission.)

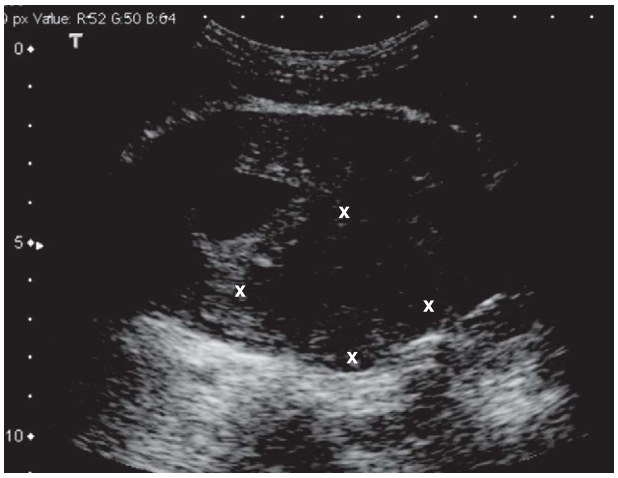

Figure 98-13. Ultrasound image of a uterine fibroid (within x's). (Courtesy of Robert Reardon, MD, Hennepin County Medical Center; used with permission.)

seen in the folds of skin in the neck, groin, or axilla.[30] Other causes of bleeding include vaginal or cervical lesions, which may be visible on the speculum exam. A leiomyoma or fibroid uterus may be palpable on the bimanual exam.[31] Patients with endometrial cancer frequently have an enlarged uterus as well.

Diagnostic Strategies

Laboratory Studies. In evaluating a woman of reproductive age with vaginal bleeding, a urine pregnancy test is the most essential laboratory test. If the patient is not pregnant, additional laboratory studies may be indicated depending on specific features of the history and physical exam. In a patient with excessive bleeding, any hemodynamic instability, or clinical evidence of anemia (e.g., excessive fatigue, pale conjunctiva), a hemoglobin and hematocrit may provide helpful information. Coagulation studies should be considered in patients with underlying liver disease or other coagulopathies.[29]

Imaging

Ultrasonography. Transvaginal ultrasonography may reveal a fibroid uterus, endometrial thickening, or a focal mass.[32] Endometrium measuring less than 4 mm thick is under the influence of low estrogen, either in the early follicular phase or in menopause, for example. Thickened endometrium may indicate an underlying lesion or excess estrogen[33] (Fig. 98-12). For a majority of nonpregnant patients with abnormal uterine bleeding, these ultrasound findings do not immediately affect ED decision-making. In patients who have access to adequate gynecologic services, imaging may be deferred until follow-up evaluation with the gynecologist. The decision to perform ultrasound imaging in the ED will depend on the urgency to determine the etiology of bleeding and on the reliability of outpatient follow-up.

With ED pelvic ultrasound imaging in nonpregnant patients, the etiology of the bleeding is determined in approximately 60% of cases. Uterine fibroids are by far the most common diagnosis (Fig. 98-13), but in one study, 9.6% of patients had endometrial changes suggestive of malignancy.[34] This finding illustrates the importance of arranging follow-up for any patient with new abnormal uterine bleeding, particularly if she has risk factors for endometrial cancer.

Differential Considerations

The etiology of abnormal uterine bleeding is extensive and includes systemic disease, structural lesions such as a fibroid uterus, hormonal abnormalities, and iatrogenic causes such as medication side effects. A careful physical exam will exclude vaginal or rectal sources of bleeding.

Management

The likely causative disorder, as well as the amount of bleeding, will guide the ED management. Nonsteroidal anti-inflammatory medications are generally effective for relief of associated cramping pelvic pain.[21] For anovulatory bleeding, combination oral contraceptive pills can help regulate the cycle and also counteract the effects of long-term effects of unopposed estrogen on the endometrium. In a patient who desires contraception and is not heavily bleeding on presentation to the ED, a combination oral contraceptive with 20 to 35 µg of ethinyl estradiol may be prescribed.[20] In the patient with heavy bleeding, an oral contraceptive with 35 µg of estrogen can be taken twice a day for 5 to 7 days until the bleeding stops, at which time the dose is decreased to once a day until the pack is completed.[21] Rarely, a patient will present with uncontrolled bleeding and signs of significant blood loss. These patients should have aggressive resuscitation with saline and blood as with other types of hemorrhagic shock. In these patients, surgical removal of the culprit lesion if one is present, or an urgent dilation and curettage (D&C) procedure may be necessary. Alternatively, intravenous conjugated estrogen (Premarin) may be used. The dose is 25 mg IV every 4 to 6 hours until the bleeding stops.[35]

EMERGENCY CONTRACEPTION

Emergency contraception, agents for which are known as the *morning-after pill*, consists of therapy to prevent pregnancy after unprotected sexual intercourse. It is estimated that more than 1 million unintended pregnancies could be avoided if emergency contraception were used.[36] The most common reasons cited by patients seeking emergency contraception include failure to use contraception and failure of the contraception method, such as from a broken condom or missed oral