**Chapter 100**

**Selected Gynecologic Disorders**

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**PERSPECTIVE**

Many women come to the emergency department (ED) with 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 ovarian torsion, also known 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 ovarian 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.

**OVARIAN TORSION**

**Principles of Disease**

Ovarian torsion accounts for approximately 3% of gynecologic emergencies. While ovarian torsion can occur in young girls and is increasingly recognized in postmenopausal women, it is still most common in the reproductive years because of the regular development of a corpus luteal cyst during the menstrual cycle. Ovarian torsion is typically caused by a twisting of both the ovary and the fallopian tube on the vascular pedicle. Most cases of torsion (50-80%) are associated with an ovarian tumor, typically a benign neoplasm; with large, heavy cysts, as seen in ovarian hyperstimulation syndrome after in vitro fertilization; or with polycystic ovaries. Torsion may be a complication of pregnancy. Torsion of a normal ovary only rarely occurs. 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. In ovarian 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 (Fig. 100-1). Thrombosis of the ovarian vein and artery can occur as well. The ovary is often salvageable if the diagnosis is made before thrombosis occurs. Because of the dual blood supply of the ovary from both the uterine and ovarian arteries, complete arterial obstruction is rare (Fig. 100-2).

**Clinical Features**

Ovarian torsion can often be challenging to diagnose, because the classic symptoms of severe, sharp unilateral abdominal pain and nausea may not be present. The presence of known risk factors for ovarian torsion such as an ovarian mass or infertility treatments may suggest the diagnosis. 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 half of the patients. Patients reported pain from several hours to weeks in duration, most likely from intermittent ischemia, and almost all had some pain on abdominal palpation. Nausea was a symptom in many of the patients. Other series report similar findings.

**Diagnostic Strategies**

**Laboratory Tests**

No specific laboratory tests are helpful in the evaluation of a patient for suspected ovarian 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, but this is not a reliable indicator of ovarian torsion.

**Imaging**

**Ultrasonography.** Ultrasound examination is the initial imaging test in the evaluation of patients with pelvic pain suggestive of ovarian torsion. Enlargement of the ovary is the most common ultrasound finding, but 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 is often absent, particularly early in the presentation (Fig. 100-3). The ultrasound study may reveal a mass in the ovary or evidence of hemorrhage (Fig. 100-4). The ultrasound appearance of ischemia can vary depending on the duration of the symptoms. Free pelvic fluid also may be seen. 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. The characteristic appearance of torsion may be difficult to appreciate if the ovary is obscured by an associated mass.

**Doppler Ultrasound Examination.** Doppler ultrasound findings are inconsistent in ovarian torsion. Many cases of surgically proven torsion will have documented blood flow on Doppler examination because the ovary has a dual blood supply from both the ovarian and uterine arteries. Because the torsion may be intermittent, the findings may also vary depending on the time of the examination. If a large mass is present, the examination may be technically difficult to perform. Despite these limitations, the Doppler examination is still useful because detection of abnormal venous flow is particularly important in early cases of torsion.
(Fig. 100-5). Visualization of the twisting of the pedicle and the coiled vessels is referred to as a “whirlpool sign.” Lee and colleagues report an 88% accuracy for torsion when the twisted pedicle or whirlpool sign is visualized. In summary, the combination of ultrasound with Doppler studies is the initial study of choice in considering the diagnosis of ovarian torsion; however, it is important for the clinician to appreciate that many of the findings can be subtle and may be negative, particularly in early presentations.

Computed Tomography. When renal colic and appendicitis also are strong considerations in the differential diagnosis for acute pelvic pain, abdominopelvic computed tomography (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 (Fig. 100-6). Associated hemorrhage in patients with hemorrhagic infarction can be seen. A retrospective review
Figure 100-5. 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 100-6. Computed tomography scans of the pelvis of a patient with adnexal 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.)

of CT scans of patients with confirmed torsion found that every CT scan had evidence of an abnormality, including ovarian enlargement or the presence of a mass or cyst, suggesting that torsion is unlikely if the CT visualized a normal ovary. In contrast, another study of surgically confirmed ovarian torsion cases found that CT correctly diagnosed 5 of 13 cases (38%), as opposed to ultrasonography, which correctly identified 15 of 21 cases (71%). Therefore, negative imaging findings should be interpreted with caution when clinical suspicion is high, but with lower suspicion a normal-appearing ovary on CT scan can be reassuring.

Magnetic Resonance Imaging. Magnetic resonance imaging (MRI) is not typically ordered in the ED but may also demonstrate findings consistent with torsion. It is particularly helpful if the diagnosis is not clear, such as with intermittent pain over days, or when the history is highly suggestive but the ultrasound is not conclusive. Findings on MRI suggestive of torsion are similar to those on CT. Box 100-1 lists the common imaging findings in ovarian torsion.

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

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 ultrasound or CT if necessary can usually distinguish between these possibilities.

**Management**

Once the diagnosis of ovarian torsion has been made, the patient should be taken to the operating room as soon as possible. Pediatric patients taken to surgery more than 24 hours later have been found to have a zero salvage rate, compared with patients who had the best chance for salvage—those who were taken to the operating room within 8 hours. 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. This is particularly true in adolescent patients. Ovarian function returns in a majority of patients with surgery that saves the ovary and is frequently 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.

**Box 100-1 Imaging Characteristics of Adnexal 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 and 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

**OVARIAN CYSTS AND MASSES**

**Principles of Disease**

Ovarian cysts are the most common cause of gynecologic masses. They occur at any stage of life but are most frequent in the reproductive years because of the cyclic changes of the ovary associated with menstruation (Fig. 100-7). Most ovarian cysts are benign and resolve with no interventions, but on occasion they may be malignant or associated with significant complications such as hemorrhage or torsion.

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**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 examination. Follicular cysts are rarely associated with hemorrhage. Presentation of a corpus luteal cyst may range from an asymptomatic mass to dull, chronic pelvic pain to severe pain associated with rupture. Rupture of a corpus luteal cyst is frequently associated with a significant degree of hemorrhage. As with a follicular cyst, rupture may follow a pelvic examination, 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 discov-
normal ovary, and Figure 100-10 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 ascites or free fluid.¹⁰

Computed Tomography. When the differential diagnosis of unilateral pelvic pain is broad, particularly in the patient with associated gastrointestinal symptoms or more diffuse pain, a CT scan may be the initial imaging study. CT scan can also detect a cyst and associated complications including torsion as noted earlier. A follow-up ultrasound examination may be useful in select cases after the CT scan has been obtained, particularly if the cyst is complex. CT findings suggestive of malignancy are cystic-solid mass; necrosis in a solid lesion; cystic lesion with thick, irregular walls, papillary projections, or both; and the presence of ascites, peritoneal metastases, and lymphadenopathy.²⁵

Differential Considerations

It is important to rule out other causes of pelvic pain that require intervention, such as ectopic pregnancy, pelvic inflammatory disease, urinary tract infections, renal colic, appendicitis, and diverticulitis. Cysts range from the benign, simple cyst to ovarian malignancies, so the specific appearance of the cyst is important. Large cysts or masses are a risk factor for ovarian torsion.

Management

Patients with a simple cyst and decrease in their symptoms may be safely discharged with referral for outpatient gynecologic follow-up to ensure resolution of the cyst. Most uncomplicated, simple cysts will resolve within a month. A recent prospective study followed premenopausal patients diagnosed with benign (<6 cm) cysts treated with conservative management for a median of 42 months.²⁶ Lesions included simple cysts, hemorrhagic cysts, endometriomas, and hydrosalpinx. All the cysts resolved after 2 years, and no patients developed signs and symptoms of ovarian cancer. A complex cyst requires more urgent gynecologic intervention, and these patients may benefit from gynecology consultation in the ED, particularly if reliable follow-up is unlikely or if the patient is particularly symptomatic.
A large number of possible conditions can cause abnormal uterine bleeding. Return-to-norm 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.26
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 cause of bleeding and on the reliability of outpatient follow-up. ED pelvic ultrasound imaging in nonpregnant patients can determine the cause of the bleeding in approximately 60% of cases. Uterine fibroids are by far the most common diagnosis (Fig. 100-13), but in one study 9.6% of patients had endometrial changes suggestive of malignancy, illustrating the importance of arranging follow-up for any patient with new abnormal uterine bleeding.

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 examination 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. 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. 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 bleeding stops. Rarely, a patient will have uncontrolled bleeding and signs of significant blood loss on presentation. These patients should receive 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 is likely necessary. Alternatively, intravenous conjugated estrogen (Premarin) may be used. The dose is 25 mg intravenously (IV) every 4 to 6 hours until the bleeding stops.

Emergency contraception, also commonly 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 per year if emergency contraception were used. The most common reasons cited by patients seeking emergency contraception include the failure to use contraception and the subsequent dose 12 hours later; however, taking the doses simultaneously is equally effective. Emergency contraception should be administered before 24 hours if possible but can be given up to 120 hours after intercourse. The Yuzpe method is 87 to 90% effective if the regimen is given within 72 hours; this rate drops to 72 to 87% if the pills are given between 72 and 120 hours. Plan B is noted to be 89% effective in preventing pregnancy.

Emergency contraception may be offered after inadequately protected intercourse to any woman who does not desire pregnancy. The typical contraindications to oral contraceptives do not apply to emergency contraception because the duration of therapy is so brief. Emergency contraception has no adverse effects on a developing fetus and does not pose a risk to an established pregnancy. A majority of nonpregnant women experience menses within a week of the expected time, but irregular bleeding may occur. It is still possible for a patient who uses emergency contraception to get pregnant in the same menstrual cycle, so she should be advised to use an alternative form of contraception and to undergo a pregnancy test if menstruation is delayed more than 3 weeks. Advance provision of emergency contraception does not increase the number of unprotected sexual encounters.

In 2007, after FDA approval, Plan B became available nationally over the counter without a prescription. Pregnancy rates as well as rates of sexually transmitted diseases and sexual activity have remained unchanged even though the use of emergency contraception has increased. Even though Plan B is available over the counter, follow-up studies highlight ongoing barriers to access, including cost and patient awareness, and highlight the importance of continued education including education on the use of primary contraceptive methods.

**DISPOSITION**

A majority of patients with pelvic pain from ovarian cysts or abnormal uterine bleeding without hemodynamic compromise may be managed with specific therapies to minimize symptoms and should be referred to a gynecologist for definitive management on an outpatient basis. Patients with confirmed or suspected ovarian torsion or severe, acute abnormal uterine bleeding and hemodynamic instability require urgent gynecology consultation and hospitalization. Patients who receive emergency contraception should be counseled regarding birth control and have a follow-up pregnancy test should they miss their next period.

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**KEY POINTS**

- Ovarian torsion is easily missed on initial presentation. This diagnosis should be a consideration in any patient with known risk factors, even if symptoms are subtle or atypical.
- Abnormal uterine bleeding has many structural and hormonal causes. A careful history and physical examination and selected imaging can often allow determination of the likely cause.
- Ultrasound examination may distinguish among the various types of ovarian cysts and identify associated complications such as torsion and hemorrhage.
- Emergency contraception is a safe, effective option to prevent undesired pregnancy. Levonorgestrel (progestin) as Plan B is more effective and is associated with fewer side effects than the traditional Yuzpe method.

The references for this chapter can be found online by accessing the accompanying Expert Consult website.
References


