Gynecologic Pain and Vaginal Bleeding

Jamie L. Collings and Nicholas A. Borm

VAGINAL FOREIGN BODY
The epidemiology of vaginal foreign bodies is largely unknown, but one study theorizes that approximately 20% of preteenage girls with vaginal bleeding with or without discharge and 50% of those with bleeding and no discharge will prove to have vaginal foreign bodies.

ENDOMETRIAL CANCER
Endometrial cancer is the fourth most common cancer in women and occurs in approximately 25 per 100,000 women. This malignant disease develops during the reproductive and menopausal years, with most patients being 50 to 59 years of age. About 5% of women younger than 40 have adenocarcinoma, and it is diagnosed in a quarter of patients before menopause. Many cases of endometrial cancer go undetected given that Papanicolaou smears detect only 50% of cases and the diagnosis is rarely considered in perimenopausal women despite the aforementioned statistics.

CERVICAL CANCER
Cervical cancer is the second most common malignancy in women worldwide. Approximately 11,000 new cases are diagnosed annually in the United States, and it accounts for around 4000 deaths per year. Minority populations are more commonly affected. The peak incidence of cervical cancer occurs in women 45 to 54 years of age; however, there is a surge in prevalence in women in their 20s and 30s as human papillomavirus (HPV) rates have increased.

PATHOPHYSIOLOGY
Common terminology and definitions for vaginal bleeding are listed in Box 124.1. An understanding of the normal female reproductive cycle is useful when caring for patients with vaginal bleeding and pelvic pain. The normal reproductive cycle is 28 days, with a range of 21 to 35 days, and the average age at menarche is approximately 12.5 years. The complex hormonal feedback mechanism that governs the female reproductive cycle is controlled by the hypothalamic-pituitary-ovarian (HPO) axis. Days 1 to 14 are known as the follicular or proliferative phase and are dominated by the release of gonadotropin-releasing hormone (GnRH) from the hypothalamus; GnRH in turn stimulates pituitary release of follicle-stimulating hormone (FSH). During this phase a dominant ovarian follicle matures and produces estrogen, which causes...
the endometrium to thicken and prepare for possible embryo implantation. Positive feedback of estrogen to the pituitary gland induces a surge in luteinizing hormone (LH) on day 14 of the cycle, which results in ovulation. Days 14 to 28 are known as the luteal or secretory phase; this phase is predominately by progesterone production from the corpus luteum, which induces maturation of the endometrium. If conception and implantation do not occur, the corpus luteum involutes, estrogen and progesterone levels fall, and menstruation occurs.

Changes in the endometrium occur at each step of the reproductive cycle. During the proliferative phase the endometrium grows and thickens in response to estrogen as it prepares for implantation of an embryo. During the secretory phase the endometrium matures under the influence of progesterone and glands and secretory vacuoles develop. As progesterone levels drop at the end of the secretory (luteal) phase, prostaglandins are released and cause vasospasm within the endometrial vasculature. This leads to sloughing of the outer layers of the endometrium, and thus menstruation occurs.

Disruption at any point in this feedback loop may cause pelvic pain or abnormal vaginal bleeding.

DYSFUNCTIONAL UTERINE BLEEDING
DUB is the most common cause of menorrhagia in menstruating females and is defined as abnormal uterine bleeding in the absence of organic disease. DUB can be ovulatory or anovulatory. Ovulatory DUB is hallmarked by regular intervals of increased menstrual flow. The root cause is an abnormality in uterine hemostasis secondary to cytokine and prostaglandin production. More commonly (accounting for 90% of cases of DUB), anovulatory DUB is hallmarked by irregular intervals of alternating heavy and light flow. This can be caused by primary ovarian disorders or a disruption in the HPO axis.

Polycystic ovarian disease is classically associated with anovulatory uterine bleeding. It is defined by ovulatory failure, which leads to the absence of a corpus luteum and thus the lack of progesterone production and therefore unopposed action of estrogen on the endometrium. The uterine lining persists in the proliferative phase until it outgrows its vascular supply and degenerates, thereby leading to irregular menses with alternation between heavy and light flow. Women often have signs of hyperandrogenism, including hirsutism, obesity, acne, palpable enlarged ovaries, and acanthosis nigricans (hyperpigmentation typically in the folds of the skin of the neck, groin, or axilla).

Anovulatory DUB is most commonly seen in postpubescent girls secondary to immaturity of hypothalamic function. In general, it is failure to mount an LH surge that causes this dysfunction. As the central nervous system matures, the menses are ultimately regulated. In addition, systemic disease such as thyroid disorders, extreme fluctuations in weight, excessive exercise, or stress can all disrupt the HPO axis and lead to anovulation.

UTERINE LEIOMYOMAS (FIBROIDS)
Uterine leiomyomas are benign tumors arising from the myometrium that ultimately disrupt the normal contour of the endometrium. Abnormal uterine bleeding is the most common symptom and is usually manifested as chronic heavy and prolonged menses, or menometrorrhagia. The location of the myomas seems to determine the majority of the symptomatology, whereas size is of secondary importance.

The disease process just described generally occurs in the fourth decade of life and usually abates after menopause. Approximately 10% to 40% of fibroids will regress over a period of 6 months to 3 years, and almost all symptomatology will abate at the time of menopause because these uterine tumors are estrogen sensitive. With the use of postmenopausal hormone replacement therapy, however, symptoms may continue past the cessation of menses.

VAGINAL FOREIGN BODY
Vaginal foreign bodies can lead to vaginal bleeding secondary to direct trauma, local irritation, superimposed infection, or any combination of these causes. The two most common foreign bodies are toilet tissue (minors) and tampons, although a wide range of vaginal foreign bodies have been reported.

ENDOMETRIAL CANCER
Risk factors for the development of endometrial cancer include age older than 35 years, history of anovulatory cycles, nulliparity, obesity, tamoxifen therapy, exogenous estrogen use without progestins, and diabetes mellitus. Almost all these...
风险因素与雌激素水平升高有关，可能导致持续暴露于雌激素。

**CERVICAL CANCER**

风险因素与宫颈癌密切相关，如性行为因素、年轻年龄、首次性行为时的年龄，以及性传播疾病的先前历史。所有这些风险因素增加暴露于HPVs，这已被识别为宫颈癌的主要风险因素。

**PRESENTING SIGNS AND SYMPTOMS**

阴道出血可以显著增加在数量和严重程度。进行详细的病史和体格检查，以评估出血的起始、持续时间和量。评估阴道出血的严重性包括确定出血的周期、量和时间。

**DYSFUNCTIONAL UTERINE BLEEDING**

功能失调性子宫出血的典型发现是无痛的、性交后的异常阴道出血。经常与宫颈癌、子宫内膜癌、宫颈癌和宫颈癌的异常出血有关。

**TERMINOLOGY**

<table>
<thead>
<tr>
<th>TERMINOLOGY</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amenorrhea</td>
<td>Cessation of menses for &gt;6 mo</td>
</tr>
<tr>
<td>Dysmenorrhea</td>
<td>Pain associated with menses</td>
</tr>
<tr>
<td>Hypomenorrhea</td>
<td>Menstrual volumes &lt; 20 mL/cycle</td>
</tr>
<tr>
<td>Menorrhagia</td>
<td>Menses &gt; 80 mL/cycle or occurring for &gt;7 days</td>
</tr>
<tr>
<td>Metrorrhagia</td>
<td>Vaginal bleeding between menstrual cycles or irregular cycles</td>
</tr>
<tr>
<td>Menometrorrhagia</td>
<td>Prolonged or heavy bleeding at irregular intervals</td>
</tr>
<tr>
<td>Oligomenorrhea</td>
<td>Decreased frequency of cycles (&gt;35 days per cycle)</td>
</tr>
<tr>
<td>Polymenorrhea</td>
<td>Increased frequency of cycles (&lt;21 days per cycle)</td>
</tr>
<tr>
<td>Postmenopausal bleeding</td>
<td>Bleeding 6-12 mo after menopause</td>
</tr>
</tbody>
</table>

**DIFFERENTIAL DIAGNOSIS AND MEDICAL DECISION MAKING**

在评估任何有阴道出血的女性时，应首先确定是否怀孕，因为这将大大改变诊断和治疗的途径。

大多数异常阴道出血的原因是功能失调性子宫出血和子宫肌瘤。表124.1和124.2列出了功能失调性子宫出血和非妊娠女性的鉴别诊断。图124.1详细说明了在急诊科（ED）中就诊的患者。

**DYSFUNCTIONAL UTERINE BLEEDING**

功能失调性子宫出血的典型症状包括慢性重型和长期的月经期或不规则的月经。功能失调性子宫出血可能表现为月经周期的延长或不规则。

**VAGINAL FOREIGN BODY**

轻度阴道出血可能是早期妊娠的唯一症状，如果伴有感染，可能是阴道或宫腔内留置异物。如果伴有感染，阴道分泌物或阴道炎症。

**ENDOMETRIAL CANCER**

症状包括无痛的绝经后阴道出血。在更年期的患者中，这种出血通常会增加，且会变得更严重。功能失调性子宫出血和非妊娠女性的异常出血在功能失调性子宫出血和非妊娠女性的异常出血。

**CERVICAL CANCER**

宫颈癌的典型表现是无痛的、持续的子宫内膜癌和宫颈癌。功能失调性子宫出血和非妊娠女性的异常出血的典型发现是无痛的、性交后的异常阴道出血。经常与宫颈癌、子宫内膜癌、宫颈癌和宫颈癌的异常出血有关。

**TERMINOLOGY**

<table>
<thead>
<tr>
<th>TERMINOLOGY</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amenorrhea</td>
<td>Cessation of menses for &gt;6 mo</td>
</tr>
<tr>
<td>Dysmenorrhea</td>
<td>Pain associated with menses</td>
</tr>
<tr>
<td>Hypomenorrhea</td>
<td>Menstrual volumes &lt; 20 mL/cycle</td>
</tr>
<tr>
<td>Menorrhagia</td>
<td>Menses &gt; 80 mL/cycle or occurring for &gt;7 days</td>
</tr>
<tr>
<td>Metrorrhagia</td>
<td>Vaginal bleeding between menstrual cycles or irregular cycles</td>
</tr>
<tr>
<td>Menometrorrhagia</td>
<td>Prolonged or heavy bleeding at irregular intervals</td>
</tr>
<tr>
<td>Oligomenorrhea</td>
<td>Decreased frequency of cycles (&gt;35 days per cycle)</td>
</tr>
<tr>
<td>Polymenorrhea</td>
<td>Increased frequency of cycles (&lt;21 days per cycle)</td>
</tr>
<tr>
<td>Postmenopausal bleeding</td>
<td>Bleeding 6-12 mo after menopause</td>
</tr>
</tbody>
</table>
reproductive years is an abnormal pregnancy. Once pregnancy is ruled out, further laboratory testing and diagnostic imaging can be tailored to each particular patient.

Complete blood count analysis is prudent in most patients with abnormal vaginal bleeding and can both provide analysis for anemia and establish a baseline hemoglobin and hematocrit level for the patient. Further laboratory analysis could include thyroid function tests and prolactin levels because these abnormalities are associated with ovulatory dysfunction. If significant bleeding is a concern, liver function tests and coagulation factor assay should be performed because hepatic disease and inborn errors of coagulation can complicate abnormal vaginal bleeding.

The mainstay of imaging for patients with abnormal vaginal bleeding is pelvic ultrasonography. Ultrasound imaging can be helpful in evaluating the status of the endometrium to look for hyperplasia, carcinoma, polyps, and uterine fibroids and, if available, can direct treatment and follow-up care for the EP.

UTERINE LEIOMYOMAS (FIBROIDS)
The diagnosis of fibroids is based on the physical examination finding of an enlarged, mobile uterus with irregular contours in combination with pelvic ultrasound imaging. It is important that the physician keep a broad differential diagnosis when identifying a new uterine mass because both benign and malignant lesions may be manifested similarly. Other conditions characterized by an enlarged uterus include pregnancy, adenomyosis, hematometra, uterine sarcoma, uterine carcinosarcoma, endometrial carcinoma, and metastatic disease.

Transvaginal ultrasound remains the primary imaging modality in this patient population. This study has high sensitivity (95% to 100%) for detecting myomas in mild to moderate cases of uterine enlargement. Other imaging modalities include diagnostic hysteroscopy, magnetic resonance imaging (MRI), and hysterosalpingography.

VAGINAL FOREIGN BODY
Once a vaginal foreign body is suspected, a thorough gynecologic examination, including a speculum and bimanual examination, should be completed. The physician should make every attempt to identify secondary injury from the foreign body and intervene as necessary.

If secondary systemic infection is a concern, urgent laboratory testing and diagnostic imaging should take place to evaluate for end-organ injury. Testing may include laboratory tests such as a complete blood count, chemistry panel, lactate analysis, and blood cultures. Diagnostic tools such as plain film radiographs or computed tomography (CT) scans of the abdomen and pelvis may be indicated depending on the severity of the symptoms.

ENDOMETRIAL CANCER
No specific laboratory testing is necessary in the ED setting to evaluate for endometrial adenocarcinoma. As with all vaginal bleeding, assessment of the patient and the need for a complete blood count analysis and other laboratory testing founded on a differential diagnosis is done on a case-by-case basis.

CERVICAL CANCER
Again, no specific laboratory testing is necessary in the ED setting to evaluate for cervical cancer. The patient may need a complete blood count analysis and other laboratory testing

<table>
<thead>
<tr>
<th>CAUSE</th>
<th>MECHANISM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight loss</td>
<td>Hypothalamic suppression of GnRH</td>
</tr>
<tr>
<td>Stress</td>
<td></td>
</tr>
<tr>
<td>Excessive exercise</td>
<td></td>
</tr>
<tr>
<td>Polycystic ovarian disease</td>
<td>Excessive estrogen effects on the endometrium</td>
</tr>
<tr>
<td></td>
<td>Anovulatory cycles</td>
</tr>
<tr>
<td>Hypothyroidism</td>
<td></td>
</tr>
<tr>
<td>Hyperthyroidism</td>
<td>Changes in androgen and estrogen production</td>
</tr>
<tr>
<td>Hyperprolactinemia (prolactina)</td>
<td>Mass effect on the pituitary stalk reduces GnRH secretion</td>
</tr>
<tr>
<td>Liver failure</td>
<td>Decreased production of vitamin K–dependent clotting factors</td>
</tr>
<tr>
<td></td>
<td>Increased estrogen levels secondary to decreased metabolism</td>
</tr>
<tr>
<td>Renal failure</td>
<td>Inherent platelet dysfunction</td>
</tr>
<tr>
<td>Primary coagulopathies:</td>
<td></td>
</tr>
<tr>
<td>Immune thrombocytopenia</td>
<td>Platelet dysfunction</td>
</tr>
<tr>
<td>von Willebrand disease</td>
<td></td>
</tr>
<tr>
<td>Myeloproliferative disorders</td>
<td></td>
</tr>
<tr>
<td>Cushing disease</td>
<td>Mass effect on the pituitary stalk reduces GnRH secretion</td>
</tr>
<tr>
<td></td>
<td>Decreased LH, FSH function</td>
</tr>
</tbody>
</table>

FSH, Follicle-stimulating hormone; GnRH, gonadotropin-releasing hormone; LH, luteinizing hormone.
CHAPTER 124  GYNECOLOGIC PAIN AND VAGINAL BLEEDING

Fig. 124.1 Algorithm outlining an approach to patients with abnormal vaginal bleeding. CBC, Complete blood count; OCPs, oral contraceptive pills; TSH, thyroid-stimulating hormone.

on a case-by-case basis, depending on the degree of bleeding and other factors associated with the findings and evaluation for malignant spread. Further diagnostic imaging is generally performed for staging purposes and may include chest radiography, CT, or positron emission tomography.

TREATMENT

DYSFUNCTIONAL UTERINE BLEEDING

Oral contraceptive pills (OCPs) remain first-line therapy for DUB. OCPs suppress endometrial development, reestablish predictable bleeding patterns, decrease menstrual flow, and lower the risk for iron deficiency anemia. Treatment can be effective in either a cyclic or continuous regimen, and many gynecologists recommend tapering of OCPs over 1-week period to control acute blood loss in patients with DUB. The typical regimen includes low-dose OCPs two to three times daily for 7 days, 7 days off for withdrawal bleeding, followed by once-daily OCP use for 3 months. Single-agent therapy with estrogen or progesterone alone is used in selected cases and is best prescribed with gynecologic consultation.

If significant hemorrhage from a uterine source is leading to hemodynamic instability, the physician must consider a primary bleeding disorder. In this case, laboratory analysis should focus on identification of disseminated intravascular...
coagulation, thrombocytopenia, or inherited coagulopathies with a focus on repletion of blood products as necessary and prompt gynecologic consultation. In certain cases, desmopressin has been shown to be effective in controlling hemorrhage because it rapidly increases von Willebrand factor and factor VIII with duration of action lasting about 6 hours.

In these extreme cases or in patients with medical failure, surgical intervention may be necessary, including dilation and curettage or endometrial ablation; if all else fails, abdominal or vaginal hysterectomy may be indicated.

**UTERINE LEIOMYOMAS (FIBROIDS)**

Treatment of leiomyomas is generally initiated when the tumors become symptomatic and is dependent on size, location, severity, age, and reproductive plans. OCPs again are the first-line treatment for medical management; however, although they may work well in regulating abnormal uterine bleeding, they are not very effective in reducing the bulk symptoms. More effective at medical management of fibroids are GnRH agonists. They work by causing an increase in the release of gonadotropins, which in turn desensitizes and downregulates the reproductive tissue and thus causes a hypogonadal state. Most women will experience amenorrhea and a significant reduction (35% to 60%) in uterine size within 3 months of initiation of therapy. Even though these medications are quite effective, initiation of therapy should be guided by a gynecologist, and they are rarely started in the ED setting. The addition of nonsteroidal antiinflammatory drugs (NSAIDs) is useful in this population to regulate painful menses, but they do not have much action on uterine bleeding.

Surgical intervention is the definitive treatment of uterine myomas, which is the most common indication for hysterectomy. Hysterectomy is reserved for patients with acute hemorrhage that does not respond to medical management, women with increased risk for malignancy, those in whom minimally invasive procedures fail, or patients who no longer wish to preserve fertility. Several minimally invasive procedures such as myomectomy, endometrial ablation, or uterine artery embolization have increased in popularity and can be used in patients who wish to retain their uterus or have not yet completed childbearing.

**VAGINAL FOREIGN BODY**

Generally, prompt removal of the foreign body will result in resolution of the patient’s symptoms and is often the only intervention necessary. If toxin-mediated disease such as toxic shock syndrome is suspected, urgent administration of antibiotics is paramount and lifesaving. An antibiotic regimen targeted against staphylococcal and streptococcal species is prudent and should be augmented with clindamycin because it is a potent suppressor of the synthesis of bacterial toxin.

**ENDOMETRIAL CANCER**

Depending on the histopathology noted on endometrial biopsy and staging of the cancer, surgical or chemotherapeutic interventions may be initiated.

**CERVICAL CANCER**

As with other gynecologic malignancies, the primary role for the EP is timely recognition and referral to a gynecologic specialist who can arrange for a Papanicolaou test, colposcopy, directed biopsies, and endocervical curettage. Surgical, radiation, or chemotherapeutic interventions are tailored to the stage of cervical cancer and directed by specialty care.

**FOLLOW-UP, NEXT STEPS IN CARE, AND PATIENT EDUCATION**

Any patient with vaginal bleeding and evidence of symptomatic anemia or hypovolemia should be admitted for definitive treatment and observation. However, the majority of patients with the diseases mentioned in this section can be treated and managed as outpatients with strong emphasis on gynecologic follow-up.

As an outpatient, a patient with abnormal vaginal bleeding may undergo further testing, including a Papanicolaou smear, endometrial sampling, hormonal assays, or hysteroscopy, and can be managed by a practicing gynecologist. Most patients should be referred for follow-up, continued treatment, or further diagnostic evaluation, depending on the findings or concerns addressed in the ED.

**PELVIC PAIN**

This section of the chapter focuses on gynecologic causes of pelvic pain, including ovarian torsion, ovarian cysts, ovarian tumors, and endometriosis. Other causes of pelvic pain are covered in other sections of this textbook.

**EPIDEMIOLOGY**

**OVARIAN TORSION**

Ovarian torsion is the fifth most common gynecologic surgical emergency, and because of vague, nonspecific findings, the diagnosis is usually delayed, which can result in necrosis of the ovary and poor salvage rates. Several studies have reported salvage rates as low as 10% to 25%. Adnexal torsion can occur at any age, but the highest incidence is in the early reproductive years, with approximately 80% of cases occurring in those younger than 50 years.

**OVARIAN CYSTS**

Ovarian cysts are estimated to affect 7% to 10% of premenopausal and postmenopausal women. Up to 4% of women will be admitted to the hospital with a primary diagnosis of ovarian cysts. Approximately 3% of theca lutein cysts are complicated by torsion or hemorrhage, and approximately 30% of these cysts can cause maternal androgen excess. Ovarian cysts affect all age ranges of females, from those in utero to postmenopausal women.

**OVARIAN TUMORS**

Ovarian cancer is the most common cause of death from gynecologic tumors in the United States. Worldwide, the reported lifetime risk for the development of ovarian malignancy is 1 in 70, and it accounts for 100,000 deaths annually.

Ovarian cancer affects white women more than black women, and the incidence increases with age. The mean age of females...
with ovarian carcinoma is 56. The overall prognosis for ovarian cancer is poor, with reported 5-year mortality rates reaching 46%, but it is closely related to staging. In girls younger than 9 years, 80% of ovarian masses are malignant, with the majority being germ cell tumors. These tumors are generally localized to the ovary and have cure rates of 90% after chemotherapy.

ENDOMETRIOSIS
Endometriosis is commonly a disease of reproductive-age women, with the highest incidence of disease in those 25 to 35 years of age. It is uncommon in prepuberal girls and postmenopausal women who are not receiving estrogen replacement therapy. The disease is reported to occur in approximately 7% to 10% of the general population of women and is found in 20% to 50% of infertile women and 80% of women with chronic pelvic pain. There is a strong familial relationship, with the incidence in women who have an affected first-degree relative being significantly increased.16,17

PATHOPHYSIOLOGY
Causes of gynecologic pelvic pain in nonpregnant females can be divided into infectious, ovarian, cervical, uterine, or extrauterine. As with vaginal bleeding, an understanding of the female reproductive cycle is paramount in understanding the pathophysiology of disease.

OVARIAN TORSION
Ovarian torsion is caused by mechanical obstruction of the vascular supply to the ovary, and progressive edema and eventually necrosis ensue if the torsion is untreated.

Classically, ovarian torsion occurs unilaterally in a pathologically enlarged ovary, almost always secondary to a cyst or neoplasm. Approximately 80% of cases of torsion occur in ovaries that are 5 cm or larger, and it occurs on the right more than on the left. In young children, ovarian torsion may develop in a normal ovary secondary to developmental abnormalities such as a long fallopian tube or absent mesosalpinx. Pregnancy is a strong risk factor for ovarian torsion because of the corpus luteum increasing the ovarian mass, and it is responsible for approximately 20% of cases. Ovarian tumors and pelvic surgery also increase the risk for torsion, and it has even occurred in patients following laparoscopic hysterectomy.

OVARIAN CYSTS
Different kinds of functional ovarian cysts can form during the menstrual cycle. Follicular cysts may result from lack of physiologic release of the ovum because of excessive FSH stimulation or from lack of the normal LH surge at midcycle just before ovulation. Hormonal stimulation causes these cysts to continue to grow. Follicular cysts are typically larger than 2.5 cm in diameter.

In the absence of pregnancy, the life span of the corpus luteum is 14 days. If the ovum is fertilized, the corpus luteum continues to secrete progesterone for 5 to 9 weeks until its eventual dissolution in 14 weeks, when the cyst undergoes central hemorrhage. Failure of dissolution to occur may result in a corpus luteal cyst, which is arbitrarily defined as a corpus luteum that grows to 3 cm in diameter.

Theca lutein cysts are caused by luteinization and hypertrophy of the theca interna cell layer in response to excessive stimulation of β-human chorionic gonadotropin. This type of cyst can occur in the setting of gestational trophoblastic disease, multiple gestation, or exogenous ovarian hyperstimulation. Theca lutein cysts are usually bilateral and result in massive ovarian enlargement.

OVARIAN TUMORS
The peak incidence of ovarian tumors occurs at 55 to 65 years of age; however, the majority of ovarian masses in children are malignant. Consequently, a palpable ovary in a postmenopausal woman or prepubescent girl should be considered a malignancy until proved otherwise. Risk factors include frequent ovulation, nulliparity, late menopause, family history, and late childbearing age. Oral contraceptives are believed to decrease risk for the development of ovarian malignancies.

Epithelial tumors represent the most common histologic type (90%), with other causes including sex cord stromal tumors, germ cell tumors, and metastatic disease. These tumors appear as partially cystic lesions with solid components.18 Metastatic disease is often found on the peritoneal surfaces but can be found in the liver, small bowel, uterus, lymphatic system, and lungs. In the prepubescent population, germ cell tumors are the most common histologic type, and the risk for teratomas increases into adolescence.

ENDOMETRIOSIS
Endometriosis is defined as the presence of endometrial tissue in a location outside the uterine cavity and can be definitively diagnosed only by direct visualization via laparoscopy. There is no clear-cut explanation for the pathogenesis of endometriosis; however, several hypotheses have been proposed, including retrograde menstruation, surgical transplantation, lymphatic or hematogenous spread, cellular metaplasia, altered immunity, or genetic disposition.

The most common sites are ovarian and dependent portions of the pelvis, including the ovaries, broad ligament, fallopian tubes, sigmoid colon, and appendix. Endometriosis can sometimes be found outside the pelvis and has been reported in the breast, pancreas, liver, kidney, vertebrae, and lung.

PRESENTING SIGNS AND SYMPTOMS
Pelvic pain may be acute or chronic. Acute pain should raise concern for a life-threatening or organ-threatening process that may warrant urgent treatment or intervention. Chronic pain is more likely to represent an indolent process such as scarring or malignancy. A good history and complete physical examination focusing on the abdomen and genitourinary system will provide great insight into possible causes of the pain. Paying close attention to age, past medical and surgical history, sexual history, and timing in the reproductive cycle will further narrow the differential diagnosis.

OVARIAN TORSION
The typical finding is an acute onset of unilateral pelvic pain that can be intermittent and associated with nausea and vomiting. Approximately 25% of patients experience bilateral lower quadrant pain, and as many as 70% of patients have an element of nausea and vomiting that can often mimic a gastrointestinal
cause. Fever is evidence that necrosis of the tissue has occurred.

Findings on physical examination are traditionally nonspecific and variable. Bimanual examination will reveal a tender adnexal mass or fullness in between 50% and 90% of patients. However, absence of this finding should not exclude this diagnosis. Peritonitis usually occurs late in the disease process.

**OVARIAN CYST**
Ruptured cysts may cause an acute onset of unilateral pelvic pain and can mimic ovarian torsion or acute appendicitis. They usually occur in the second half of the menstrual cycle and begin during strenuous physical activity. Though rare, other associated symptoms may be present, including vaginal bleeding, nausea and vomiting, syncope, orthostatic changes, shoulder pain, and circulatory collapse.

**OVARIAN TUMORS**
Ovarian tumors may be accompanied by abnormal vaginal bleeding secondary to hormone secretion; however, they generally cause signs and symptoms related to a mass effect. Patients are often asymptomatic, and ovarian tumors are commonly found during evaluation or imaging for an unrelated issue. Adults generally have typical bulk-related complaints, including urinary frequency, constipation, rectal fullness, pelvic pressure, and bloating. Conversely, the pediatric population will generally have pelvic pain initially.

**ENDOMETRIOSIS**
The sometimes diffuse pelvic pain caused by endometriosis is cyclic and estrogen responsive. Pain is the most common initial symptom and can be manifested as chronic pelvic pain, dysmenorrhea, dyspareunia, back pain, or dyschezia. Bleeding can be an initial sign and may be manifested as abnormal menstrual bleeding, as rectal bleeding, or if located under the skin, as abdominal ecchymosis. Unfortunately, physical findings in patients with endometriosis are nonspecific and highly related to the location and size of the implants.

**DIFFERENTIAL DIAGNOSIS AND MEDICAL DECISION MAKING**
The differential diagnosis of pelvic pain in women is quite extensive and includes disease processes in the gastrointestinal, urinary, and reproductive systems (Box 124.2). Careful consideration should always be given to the possibility of acute appendicitis and ovarian torsion in a nonpregnant female with pelvic pain.

**OVARIAN TORSION**
The clinical diagnosis of ovarian torsion is based on findings on physical examination and clinical suspicion, in coordination with pelvic imaging; however, definitive diagnosis is based on surgical findings. Pelvic ultrasound is the first-line diagnostic imaging modality used to aid in identification of ovarian torsion. Doppler ultrasound can be used to identify the physical anatomy of the pelvic organs, as well as to detect ovarian vessel flow. Data on the sensitivity of Doppler ultrasound in detecting ovarian torsion are controversial, especially with regard to vessel flow. Sensitivities as low as 43% and as high as 100% have been reported. In contrast, Doppler ultrasound is quite specific for diagnosing torsion, with sensitivities found to be anywhere from 92% to 97%. It has been reported that up to 50% of patients with torsion may have normal findings on pelvic ultrasound. Therefore, despite negative findings on imaging, if the EP has high enough suspicion for ovarian torsion, prompt gynecologic consultation is warranted. CT and MRI have also been shown to aid in the diagnosis, but their cost and the time required for imaging are prohibitive to regular use of these imaging modalities as long as ultrasound is readily available.

Laboratory testing is generally performed in the setting of acute abdominal pain. Changes in the white blood cell count, hematocrit, and electrolytes have been seen with torsion but are quite nonspecific. Research to identify serum markers is promising, with several studies reporting that increased levels of interleukin-6 are associated with ovarian torsion; however, further investigation is warranted.

**OVARIAN CYSTS**
Routine laboratory studies will generally be ordered in patients with acute abdominal pain, especially with hemodynamic changes, as the physician attempts to rule out a ruptured ectopic pregnancy or acute appendicitis. Laboratory tests
specifically helpful in the setting of hemorrhagic cysts are a hemoglobin level, coagulation profile, and blood type and screen or crossmatch. Again, these tests are nonspecific but aid in monitoring and treatment of patients if they become unstable.

Pelvic ultrasonography is the best imaging modality because it can identify the location and size of a cyst, as well as detect free pelvic fluid, but it is not specific. The physician may also apply the concept of focused assessment with sonography for trauma (FAST) to evaluate for free intraperitoneal fluid, which if positive would raise suspicion for significant hemorrhage. If the diagnosis is unclear after pelvic ultrasound, CT of the abdomen and pelvis may be necessary, especially because it may help evaluate for nongynecologic causes.

**OVARIAN TUMORS**

Many laboratory tests and serum markers can be used to evaluate an ovarian mass; however, much of the work-up is done on an outpatient basis and is guided by a gynecologist. The laboratory testing done by an EP is usually limited to evaluation of pelvic pain in conjunction with vomiting. Further laboratory testing will probably include serum markers such as CA 125, which can be elevated in 80% of women with ovarian malignancy and is 90% sensitive in women with advanced disease. However, given that it has low sensitivity in women with early disease and can be associated with several other gynecologic and nongynecologic illnesses, routine testing in the regular population is discouraged. Promising studies of human epididymal secretory protein E4 have been shown to be more specific for ovarian carcinoma, but further investigation is warranted.

If the EP suspects or finds an ovarian mass on examination, pelvic ultrasound should be performed. Several characteristics of ovarian tumors should raise the EP’s suspicion for malignancy, such as having a complex internal structure, including complex cysts with solid components; masses in prepubescent or postmenopausal women; or persistence beyond the length of a normal menstrual cycle.

If the findings on ultrasound are equivocal or limited, further diagnostic imaging could include CT scanning of the abdomen and pelvis or MRI. CT scanning is often helpful to the EP who may be trying to evaluate or rule out other causes of pelvic pain or symptoms of a mass effect in these specific patients.

**ENDOMETRIOSIS**

As noted earlier, the diagnosis of endometriosis is made by direct visualization of the implants by surgical methods such as laparoscopy or laparotomy. Laboratory analysis is rarely done on an outpatient basis and is guided by a gynecologist. The laboratory testing done by an EP is usually limited to evaluation of pelvic pain in conjunction with vomiting. Serum CA 125 has been shown to correlate with endometriosis but is not a sensitive marker because it can be elevated in other gynecologic and nongynecologic diseases, most notably ovarian carcinoma.

Transvaginal ultrasound is the initial diagnostic imaging test for endometriosis. The classic finding on ultrasound is an ovarian cyst containing low-level homogeneous internal echoes consistent with old blood that correlates with the chocolate cyst found on laparoscopy. MRI has been reported to be useful in cases that require identification of peripheral implant spread, but it is rarely used for this purpose in the ED setting.

**TREATMENT**

Both acute and chronic pelvic pain can be debilitating, and thus early pain management is essential. In a patient with acute pelvic pain a diligent search for the cause in concert with pain management is the best course of action. Oral and intravenous narcotic medications are often needed in this patient population. Unfortunately, in patients with chronic pelvic pain, acute control of pain may be the only intervention that EPs can offer. Disease-specific diagnostic testing and treatment options are described in the following sections.

**OVARIAN TORSION**

Management of ovarian torsion is emergency operative intervention in an attempt to detorsion of the affected adnexal structures and restoration of blood flow and venous drainage. In the past the adnexal structures were surgically resected; however, recent studies and practice have shown that mechanical detorsion is effective and safe. The most important factor in preservation of ovarian function is early recognition and treatment. Several studies have reported high salvage rates when treatment is initiated within the first 24 hours of the onset of symptoms.

**OVARIAN CYSTS**

The mainstay of treatment in the majority of patients with ovarian cysts is pain control. Cyst ruptures are typically self-limited and treated with pain control and expectant management in an outpatient setting. However, significant rupture and intraperitoneal hemorrhage occasionally occur and cause hemodynamic instability. In these cases, urgent gynecologic evaluation and performance of diagnostic laparoscopy or laparotomy are indicated. An unstable patient may require aggressive fluid resuscitation and, in extreme cases, blood products and more aggressive hemodynamic stabilization with pressors or intubation.

**OVARIAN TUMORS**

When the EP finds a highly suspicious ovarian mass, prompt gynecologic referral or consultation must be arranged so that further diagnostic work-up and possible medical or surgical therapy can be initiated. Symptomatic control of bulk-related or pain-related symptoms can include urinary catheter insertion, disimpaction, or narcotic pain medications.

**ENDOMETRIOSIS**

Although optimal treatment of this chronic disease is unclear, options are focused on three main categories—pelvic pain, infertility, and pelvic mass—and tailored to each specific patient. The EP will primarily focus on the treatment of pelvic pain with NSAIDs and combined estrogen-progestin contraceptives. NSAIDs are thought to control pain, as well as affect prostaglandin production, thus altering growth and secretion of the endometrial implants. In a similar manner, OCPs induce decidualization and atrophy of the endometrial tissue and ectopic implants, which may control the cyclic pain and limit progression of the disease. The EP can initiate this therapeutic regimen in the ED setting, but it should be done with close gynecologic consultation or follow-up.

If a conservative medical approach fails, further treatment with GnRH agonists, danazol, aromatase inhibitors, or
TIPS AND TRICKS

Assume that all women of childbearing age are pregnant until proved otherwise.

In patients with strong suspicion for ovarian torsion despite negative ultrasound findings, prompt gynecologic evaluation is warranted.

About 20% to 25% of cases of endometrial cancer occur before menopause; any patient without a definitive cause of the vaginal bleeding should be referred to a gynecologist for endometrial evaluation.

DOCUMENTATION

- Age of the patient
- Gravid and parous status
- Bedside pregnancy test results
- Onset and duration of symptoms
- Recent trauma
- Duration and frequency of past menstrual cycles
- Complete sexual history, including contraception methods, number of partners, history of sexually transmitted diseases
- History of previous abnormal Papanicolaou smears
- Associated symptoms, including fever, breast changes, anorexia, weight changes, hirsutism, bowel or bladder changes
- Past medical history
- Current medications

conservative surgery may be indicated. All these treatments are coordinated by a gynecologist on an outpatient or inpatient basis, depending on severity of the symptoms.

FOLLOW-UP, NEXT STEPS IN CARE, AND PATIENT EDUCATION

Most patients with pelvic pain can also be managed on an outpatient basis with directed therapy and gynecologic follow-up. However, acute gynecologic pain, such as ovarian torsion, necessitates admission to the gynecologic service for definitive management.

SUGGESTED READINGS


REFERENCES

References can be found on Expert Consult @ www.expertconsult.com.
REFERENCES