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

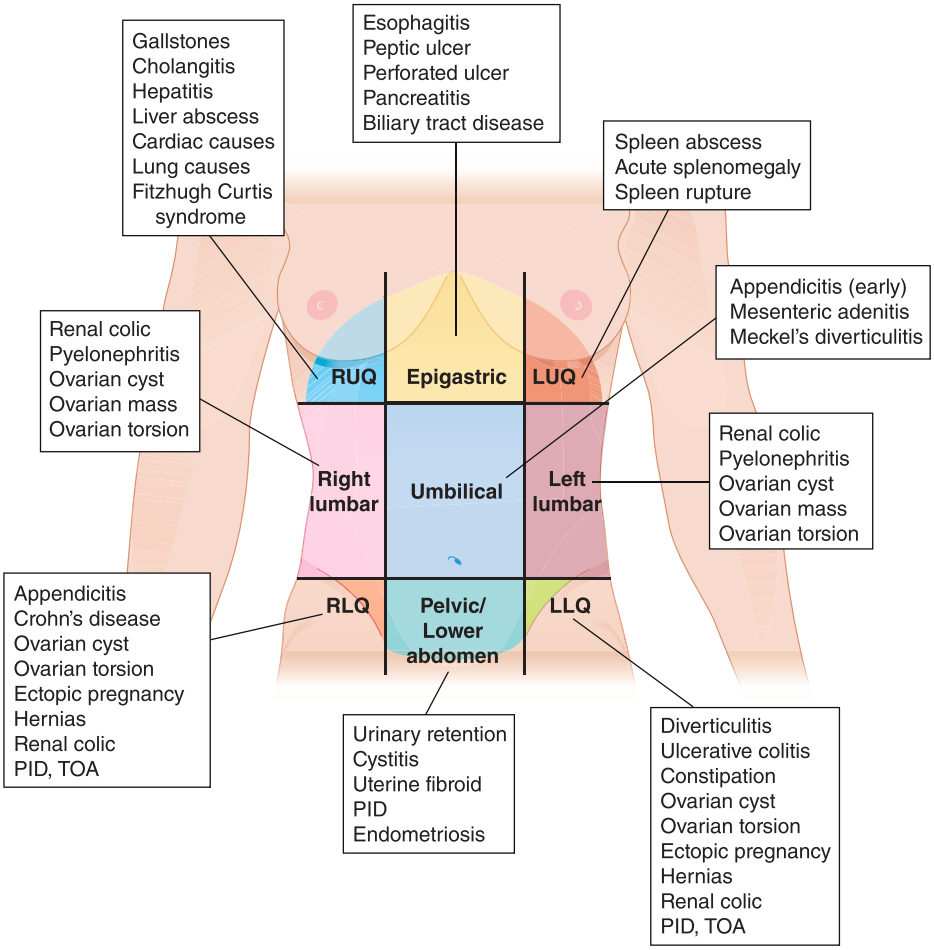

FIGURE 97-1. Differential diagnosis of abdominal pain based on location.

patients who are elderly, are obese, or have altered neurologic status. A digital rectal exam is helpful, if indicated, to evaluate complaints of rectal pain or bleeding.

A pelvic examination is usually a routine component of the exam of women with lower abdominal pain, but studies report a lack of accuracy and reproducibility of pelvic examination findings.[1,2] Pelvic examination is useful for obtaining lab specimens for sexually transmitted infections, palpation for tenderness or mass, and to check for vaginal bleeding, discharge, or foreign body.

DIAGNOSIS

In a nonpregnant female with abdominal pain, ED testing beyond a thorough history and exam is not always mandatory. For example, in a patient with multiple prior similar presentations and recent normal imaging studies, it is unnecessary, rarely helpful, and potentially harmful to repeat imaging.[3] In cases where further ED testing is determined to be unnecessary, the physician must still pay careful attention to symptom control, careful reassessment, and disposition. At the time of discharge, providers should review with the patient arrangements for close follow-up, often in 12 to 24 hours, as well as indications for return to the ED. **When benign causes are not clear from the initial evaluation and concerns for serious pathology remain, lab and/or imaging tests are necessary.**

LABORATORY EVALUATION

Obtain a pregnancy test in all women of childbearing age who still have a uterus and ovaries. See chapter 98, "Ectopic Pregnancy and Emergencies in the First 20 Weeks of Pregnancy" for a detailed discussion of pregnancy testing. A CBC is often obtained, but the WBC count is not reliable to rule in or exclude serious disease.[5] Obtain a urinalysis, and add a urine culture in pediatric patients, pregnant women, and patients at risk for complicated urinary tract infections. See chapter 91, "Urinary Tract Infections and Hematuria" for detailed discussion of urinalysis. **Be cautious in making a definitive diagnosis of urinary tract infection as the sole cause of a patient's symptoms.** For further discussion, see chapter 71.

IMAGING

US is the imaging modality of choice for genital tract pathology (ovarian cyst, ectopic pregnancy, uterine or ovarian mass, or tubo-ovarian abcess). CT is preferred when GI or GU pathology (appendicitis, diverticulitis, bowel obstruction, or renal stones) is highest in the differential diagnosis.

Bedside US can facilitate rapid diagnosis and treatment. For example, a positive focused assessment with sonography for trauma exam could help diagnose a ruptured ectopic pregnancy or significant hemorrhage from an ovarian cyst.[5] ED US can quickly identify a normal intrauterine pregnancy. Pelvic US is the primary imaging modality for evaluation of lower abdominal pain in the female patient in whom a gynecologic diagnosis is considered most likely. US is useful in diagnosis of pelvic inflammatory disease, tubo-ovarian abcess, leiomyoma, and ovarian cysts. In evaluation of possible ovarian torsion, pelvic US should include Doppler flow. Transabdominal and intravaginal probes are used for imaging of pelvic organs. In transabdominal imaging alone, a full bladder aids visualization of pelvic organs. In transvaginal imaging, an empty bladder aids visualization. US studies should never be delayed waiting for a full bladder, particularly when there is concern for a serious diagnosis such as ovarian torsion. US may be useful to evaluate for appendicitis, but it is less sensitive than CT and is operator dependent.

CT of the abdomen and pelvis is sensitive for evaluation of most abdominal and pelvic conditions. Usually IV contrast alone is sufficiently sensitive for evaluation of possible appendicitis.[6] If there is concern for pelvic abscess, or the patient weighs less than 70 kg, oral contrast may enhance accuracy of evaluation. MRI is accurate in diagnosis of many abdominal and pelvic conditions, but cost and limited availability limit its use in most EDs.

TREATMENT

Specific treatment depends on diagnosis (see below), but because the diagnostic process can be time consuming, control of pain and nausea and fluid resuscitation take priority. There is no evidence that judicious use of opiates obscures abdominal exam findings or negatively impacts outcomes. Opiates can be titrated to control pain, without causing excessive somnolence or respiratory depression. Antiemetics including ondansetron, metoclopramide, promethazine, and prochlorperazine are safe and effective. Antibiotics should be given in the ED for suspected severe intra-abdominal infection or sepsis. Choice of antibiotics depends on severity of infection and factors relevant to patients' individual risk, such as comorbid conditions and possibility of hospital-acquired infections.[7,8] See chapters 71 and 103 for further discussion of antibiotic selection.

DISPOSITION AND FOLLOW UP

When a serious or potentially surgical diagnosis is considered likely, early consultation with the appropriate specialist (general surgery, urology, or obstetrics/gynecology) is indicated. If there is persistent concern for serious pathology, admission or observation is appropriate. This applies even if the diagnosis is unclear. Patients with abnormal vitals, poorly controlled pain, and/or vomiting are best served by inpatient treatment. In many cases, diagnosis is clear after a period of observation and serial exams. Many patients seen in the ED have significant symptoms, but a specific condition may not be diagnosable in the relatively brief period of time a patient spends in the ED. Significant comorbid conditions (immunocompromised, unstable medical problems, inability to care for oneself at home) should prompt strong consideration for observation or admission.

In most patients with abdominal/pelvic pain in the ED, hospitalization is not necessary. **It is common and appropriate to discharge patients with a diagnosis of undifferentiated abdominal pain. In patients who are discharged, instructions for follow-up and indications for return to the ED should be very specific. Instructions should specify a time course during which patients should be seen for repeat exam.** Re-evaluation in 12 to 24 hours is appropriate for patients with acute abdominal pain and diagnostic uncertainty. In more chronic abdominal/pelvic pain, follow-up with a primary care provider is still important, but timing of follow-up should be specified according to individual patient needs.

OVARIAN CYSTS

Ovarian cysts, when symptomatic, usually present with sudden-onset unilateral pain that is more common on the right than left. Cervical motion tenderness and mild vaginal bleeding are sometimes present. Pain often starts during physical activity such as exercise or sexual intercourse. Functional (benign) cysts are fluid-filled sacs that develop during a normal menstrual cycle. **Follicular cysts** contain a maturing ovum and rupture at ovulation. **Corpus luteum cysts** are present after the ovum is released. If no conception occurs, the corpus luteum involutes. If fertilization takes place, the corpus luteum cyst enlarges and secretes estrogen and progesterone. **Hemorrhagic cysts** occur if a blood vessel in the cyst wall ruptures (**Figure 97-2**).

Mittelschmerz (German for middle pain) is midcycle pain at the time of ovulation caused by normal follicular enlargement prior to ovulation or follicular bleeding at ovulation. Pain is usually mild and lasts a few hours up to a few days.

FIGURE 97-2. A 4-cm hemorrhagic ovarian cyst demonstrated by endovaginal US. [Reproduced with permission from Ma OJ, Mateer JR, Blaivas M: *Emergency Ultrasound*, 2nd ed. © 2008, McGraw-Hill, New York. Fig. 14-10, p. 362.]

Complicated cyst rupture is characterized by abnormal vital signs and an acute abdomen. Hospitalization or observation is needed for serial examinations and hematocrits. Surgery may be necessary to control hemorrhage.

A **dermoid cyst** is an ovarian germ cell neoplasm that presents as a multicystic mass that contains various types of tissue including fat, skin, hair, and teeth. These cysts usually occur between age 10 and 30 years. Most are benign, but risk factors for malignant teratomas include age over 45, diameter greater than 8 cm, and rapid growth. Most uncomplicated cyst ruptures are from follicular and corpus luteum cysts. Vital signs are stable, and symptoms only last a few days.

Ovarian cysts that are <8 cm, unilocular, and unilateral are generally observed and typically resolve within two menstrual cycles. **Cysts that are large (>8 cm), solid, and multiloculated are worrisome for neoplasm, dermoid cysts, or endometriomas**. Patients with ovarian cysts, regardless of size, should be referred to the gynecologist or primary care physician for follow-up.

ENDOMETRIOMAS

Endometriomas are called "chocolate cysts" because they usually contain thick brown fluid. They present as a pelvic mass caused by growth of ectopic endometrial tissue within an ovary. Endometriomas may rupture, and patients can present with peritoneal signs/symptoms. Endometriomas may also present similar to endometriosis (pelvic pain, dysmenorrhea, and dyspareunia).

OVARIAN NEOPLASM

An ovarian mass in a postmenopausal woman is malignant until proven otherwise. The mean age at diagnosis is 50 to 60 years. Patients present with nonspecific signs/symptoms, including anorexia, dyspepsia, early satiety, constipation, bloating, and ascites. Cancers of the endometrium, breast, and GI tract may metastasize to ovaries and fallopian tubes.

OVARIAN HYPERSTIMULATION SYNDROME

Ovarian hyperstimulation syndrome is a complication of ovulation induction treatments, with a clinical spectrum of severity. The syndrome can occur early, 5 to 7 days after ovulation, or later, due to rising human chorionic gonadotropin levels.

The severe syndrome is characterized by massive transudation of albumin and fluid from the vascular compartment to the peritoneal,

pleural, and sometimes, pericardial cavities.[9] Venous and arterial thrombosis are the most dreaded complications. Reports include thrombosis of the jugular, subclavian, retinal, and extremity veins and cerebral venous thrombosis. Stroke, ST-segment elevation myocardial infarction, and pulmonary embolism are also reported.[9]

ENDOMETRIOSIS AND ADENOMYOSIS

Endometriosis occurs when endometrium-like tissue outside the uterus induces a chronic inflammatory reaction. This is a common cause of pelvic pain and infertility. When endometrial tissue is in the uterine wall, it is termed adenomyosis. Both conditions cause chronic, recurrent, and cyclic pain. Dysmenorrhea and dyspareunia are often reported. US may show cystic or solid masses. Laparoscopy is the definitive method of diagnosis. Primary diagnosis is usually not made in the ED. If suspected, pain control and outpatient referral are appropriate.

FOREIGN BODY/TRAUMA

Vaginal foreign bodies (such as a retained tampon) may cause pelvic pain and vaginal discharge or bleeding. Trauma or foreign body should be considered in the differential diagnosis. Patients are not always immediately forthcoming with history due to fear or embarrassment. Complications such as abscess or perforation are rare.

OVARIAN TORSION

Ovarian torsion is a surgical emergency that requires prompt diagnosis to preserve ovarian function. Adnexal torsion is an ischemic condition almost always associated with ovarian enlargement, generally due to ovarian cysts or masses. The enlargement causes the ovary to twist, creating a fulcrum around which the oviduct revolves. Initial blockage of venous return causes congestion, leading to decreased distal arterial blood flow, which produces ischemia and necrosis of the ovary. Although the process may involve the ovary alone, torsion of both the ovary and the oviduct (adnexal torsion) is more common. Nearly 70% of torsions occur on the right side, due to the increased length of the utero-ovarian ligament on the right and the sigmoid on the left, limiting space for movement.[10]

Risk factors for torsion are pregnancy due to enlarged corpus luteum, presence of large ovarian cysts or tumors, chemical induction of ovulation (ovarian hyperstimulation syndrome), and tubal ligation. Classically, patients present with sudden-onset, severe, unilateral, lower abdominal pain that may develop after episodes of exertion. Unfortunately, atypical presentations are common, with half of patients reporting gradual onset of pain that is intermittent in nature. Nausea and vomiting is present in 70% of cases.[11]

Clinical findings classically consist of unilateral lower abdominal tenderness with guarding, unilateral adnexal tenderness on bimanual examination, and presence of a latero-uterine mass. Conversely, nearly 30% of patients have bilateral adnexal tenderness on bimanual examination, and a minority of patients may have no tenderness at all. Fifty percent of patients are initially misdiagnosed.[12]

Transvaginal US with Doppler is the primary diagnostic modality for suspected torsion. An ovary greater than 4 cm in size due to cyst, tumor, or edema is the most common ultrasonographic finding associated with torsion.[13] Conversely, given the dynamic nature of the torsion process, up to 26% of US studies reveal normal adnexa. Up to 60% of cases of torsion can be missed on arterial Doppler alone, given that arterial disruption of flow is a late clinical finding.[14] However, a positive Doppler study has a 100% positive predictive value for adnexal torsion. Recent improvements in US technology have led to assessment of venous Doppler flow, which may be the only abnormality identified in early ovarian torsion.[15] Given the dynamic nature of the torsion process, there is no one finding that conveys certainty of the absence of torsion. Thus, clinical suspicion based on history and physical exam remains important in involving gynecologic consultation if US is negative, but clinical concern remains high.[16]

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

CHAPTER 98

Ectopic Pregnancy and Emergencies in the First 20 Weeks of Pregnancy

Heather A. Heaton

GENERAL APPROACH TO WOMEN OF CHILDBEARING AGE

The differential diagnosis for women of childbearing potential who present with abdominal or pelvic symptoms or abnormal vaginal bleeding is broad (**Table 98-1**). The major clinical goals are, first, diagnosis of pregnancy, and then if pregnant, differentiating ectopic pregnancy from threatened abortion. Consider ectopic pregnancy in women of childbearing age who report abdominal or pelvic pain or discomfort, vaginal spotting or a cycle of amenorrhea, or unexplained signs or symptoms of hypovolemia. There are rare case reports of ectopic pregnancy in patients with ovaries but without a uterus. No combination of signs or symptoms is sufficient to exclude ectopic pregnancy. **If pregnancy is detected, ectopic pregnancy remains in the differential diagnosis until it can be either confirmed or excluded with conviction.**

PREGNANCY TESTING

The diagnosis of pregnancy is central to the diagnosis of ectopic pregnancy. Pregnancy tests currently in use rely on the detection of the β subunit of human chorionic gonadotropin (β-hCG) in the urine or serum. hCG is a hormone produced by the trophoblast. Intact hCG consists of the α and β subunits. Tests based on detection of the intact molecule or the α subunit can cross-react on immunologic assays with hormones found in the nonpregnant individual and are thus less specific than tests for the β-hCG subunit.

hCG preparations are currently standardized in relation to the Third International Reference Preparation. Other standard preparations are not equivalent. A preparation often referred to in earlier literature is the Second International Standard. The Third International Reference Preparation is

TABLE 98-1 Differential Diagnosis of Ectopic Pregnancy

All Patients	Pregnant Patients
Appendicitis	Normal (intrauterine pregnancy)
Inflammatory bowel disease	Threatened abortion
Ovarian pathology	Inevitable abortion
Cyst	Molar pregnancy
Torsion	Heterotopic pregnancy*
Pelvic inflammatory disease	Implantation bleeding
Endometriosis	Corpus luteum cyst
Sexual assault/trauma	
Urinary tract infection	
Ureteral colic	

*Heterotopic pregnancy = combined intrauterine pregnancy and ectopic pregnancy.