

# Ultrasound Evaluation of Pelvic Pain



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## KEYWORDS

• Ultrasound • Pelvic • Pain • Acute • Chronic • Pregnant

## KEY POINTS

- Pelvic pain is a very common complaint in women of all ages.
- Obtaining a thorough clinical history is important to help narrow the wide differential diagnosis for acute and chronic pelvic pain.
- Determination of pregnancy status using a serum hCG level test is also of utmost importance in women of reproductive age; nevertheless, clinical and laboratory results are often inconclusive.
- Pelvic ultrasound (US) is the initial imaging modality of choice and can often diagnose specific abnormalities without the need for additional imaging.
- Familiarity with the differential diagnosis of pelvic pain and knowledge of the associated US features is essential for both US technologists and radiologists to make an accurate diagnosis and facilitate appropriate clinical management.

## INTRODUCTION

Pelvic pain is a common symptom in women of all ages and is often associated with morbidity and even mortality. Pelvic pain may be either acute or chronic and may be due to a wide spectrum of causes. No matter what the underlying cause is, a thorough history and physical examination are critical. However, the absence of physical findings does not negate the significance of a patient's pain, because a normal clinical examination does not preclude the possibility of underlying pelvic pathologic abnormality.<sup>1</sup> Ultrasound (US) is the imaging modality of choice in women presenting with pelvic pain. Transabdominal (TA) and transvaginal (TV) US are ideal for diagnosis in both the emergency room and the outpatient setting given the relatively high sensitivity, lack of ionizing radiation, relatively low cost, and widespread availability.

## US SCANNING TECHNIQUE

A routine female pelvic US examination should include both TA and TV sonography (TVS). The

TA technique is typically performed first, allowing visualization of the uterus and ovaries usually using the fluid-filled bladder as an acoustic window. The initial TA scan provides a wider field-of-view for improved visualization of large masses or fluid collections. Because free fluid will collect dependently, the right hepatorenal space (ie, Morrison pouch) should also be evaluated at this time. After completion of the TA scan, the patient should void, and TVS is performed, unless contraindicated or not desired by the patient. Because of the improved resolution of the higher-frequency TV probe, TVS provides a more detailed evaluation of structures not well seen by the TA study, including the ovaries and endometrial canal. Moreover, the TV probe can be used in a manner similar to a bimanual gynecologic examination, with the examiner holding the probe in one hand and performing palpation of the pelvis transabdominally with the other hand. This technique may separate adjacent structures from a lesion to help identify its origin as well as determine organ mobility, determine site of maximal pelvic tenderness, and compress the bowel, thereby eliminating artifact

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from overlying bowel gas.<sup>2</sup> Therefore, the TA and TV examinations are complementary: both are required to perform a complete pelvic US examination.

## ACUTE PELVIC PAIN

Acute pelvic pain (APP) is defined as noncyclic lower abdominal or pelvic pain lasting less than 3 months and is often associated with nausea, vomiting, and/or leukocytosis.<sup>3</sup> Women with APP pose a challenging clinical scenario because history and physical examination findings are often nonspecific, and the differential diagnosis includes a broad range of gynecologic and nongynecologic causes (**Box 1**). The gynecologic causes of APP differ significantly based on pregnancy status, and therefore, a serum  $\beta$ -human chorionic gonadotropin (hCG) level should be obtained in all women of reproductive age presenting with APP.

### Box 1

#### Differential diagnoses for acute gynecologic and nongynecologic pelvic pain

##### Acute pelvic pain: US findings

1. Gynecologic pelvic pain
  - a. Nonobstetric
    - Large ovarian cysts<sup>a</sup>
    - Ruptured/hemorrhagic ovarian cysts
    - Ovarian torsion<sup>a</sup>
    - Pelvic inflammatory disease<sup>a</sup>
    - Malpositioned IUD
    - Degenerating fibroids
  - b. Obstetric<sup>b</sup>
    - Ectopic pregnancy
    - Ovarian hyperstimulation syndrome
    - Threatened/spontaneous abortion
    - Retained products of conception
    - Ovarian vein thrombophlebitis
    - Uterine rupture
    - Degenerating fibroids
2. Nongynecologic pelvic pain
  - Ureteral calculi
  - Appendicitis
  - Diverticulitis

<sup>a</sup> May be seen in postmenopausal women.

<sup>b</sup> Most causes of nonobstetric and nongynecologic pelvic pain can also be seen during pregnancy.

## Acute Gynecologic Pelvic Pain

Gynecologic causes of APP can be subcategorized into nonobstetric and obstetric causes. Nonobstetric causes include large simple ovarian cysts, hemorrhagic and ruptured ovarian cysts, ovarian/adnexal torsion, pelvic inflammatory disease (PID), a malpositioned intrauterine device (IUD), and degenerating fibroids. Obstetric causes of pelvic pain include ectopic pregnancy (EP), pregnancy of unknown location (PUL), spontaneous abortion (SAB), subchorionic hemorrhage, pain associated with ovarian hyperstimulation syndrome (OHSS), and degenerating fibroids. Postpartum patients may also develop pelvic pain secondary to retained products of conception (RPOC), endometritis, and ovarian vein thrombophlebitis.

### Simple ovarian cysts

Most ovarian follicles measure less than 1 cm in diameter. At ovulation, the dominant follicle usually measures 2.0 to 2.5 cm, but can measure up to 3.0 cm.<sup>4-6</sup> Follicles that fail to release an oocyte or do not regress can enlarge into follicular cysts, which are greater than 3 cm in maximum diameter, accounting for most simple ovarian cystic lesions. Although small ovarian cysts are often asymptomatic, large ovarian cysts are a common source of APP. Furthermore, cysts greater than 5 cm in diameter increase the risk of ovarian torsion.<sup>3</sup> Simple or follicular cysts appear on US as anechoic intraovarian or exophytic ovarian masses with an imperceptible wall and associated posterior acoustic enhancement. However, if harmonic imaging or spatial compounding is used, posterior enhancement will be less apparent. When large, a cyst can compress adjacent ovarian parenchyma, which may be nearly imperceptible (**Fig. 1**). In such cases, color and spectral Doppler can identify typical low-velocity, low-resistance peripheral ovarian blood flow. Most simple ovarian cysts will spontaneously resolve over time and US follow-up is not necessary for asymptomatic simple cysts less than 5 cm in maximal diameter in premenopausal women, although yearly US follow-up is advised for simple cysts measuring 5 to 7 cm in diameter. In premenopausal women, MRI is also recommended for asymptomatic simple cysts greater than 7 cm in diameter due to the risk of missing malignant mural nodularity because of potential US sampling error in large lesions.<sup>7</sup>

### Hemorrhagic and ruptured ovarian cysts

A ruptured or hemorrhagic ovarian cyst is the most common cause of APP in an afebrile, premenopausal woman presenting to the emergency room.<sup>3</sup> Although hemorrhagic cysts are

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