



## Abdominal Pain in a 20-year-old Woman

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### PRESENTATION

A healthy 20-year-old nulliparous woman presents with hematuria, urinary frequency, and urgency for 1 day. She has regular monthly menstrual cycles; the last menses was 3 weeks ago and was normal. She presented 1 month before this clinic visit with a complaint of intermittent abdominal pain for which trans-abdominal ultrasonography of her pelvis revealed a 9.7-cm cyst in the left adnexa.

She has no significant medical history or surgeries, no allergies, and no contributing family history and takes no medication or supplements. She does not smoke cigarettes, vape, or use marijuana, alcohol, or illicit drugs, and she has never been sexually active. She is a full-time student.

On physical examination she has a heart rate of 88 beats/min, a respiratory rate of 12 breaths/min, and blood pressure of 110/60 mm Hg, with a pain scale score of 0. Her height is 60 in (152.5 cm), weight is 158.8 lb (72.03 kg), and BMI is 30.97. Abdominal examination demonstrates suprapubic tenderness with no distention, guarding, rebound tenderness, hepatomegaly, splenomegaly, or palpable masses.

She declines a pelvic examination for the following reasons: 1) history and physical examination findings consistent with urinary tract infection (UTI), 2) she has never been sexually active, and 3) she did not feel comfortable undergoing a pelvic examination. The urinalysis shows 1+ leukocyte esterase, negative nitrites, and 3+ blood. Microscopic analysis shows 2 white blood cells/high-power field (HPF), 8 red blood cells/HPF, with mucous present. She receives nitrofurantoin for the diagnosis of UTI. The urine culture was positive (>100,000 colonies of group B streptococcus), although the results were not available until after her next presentation.

She presents the following day with severe abdominal pain, nausea, and nonbloody nonbilious vomiting after starting the antibiotics. Her examination shows a heart rate of 70 beats/min, blood pressure of 140/80 mm Hg, and a pain score of 9 (of 10). Abdominal examination reveals suprapubic tenderness, with left lower back tenderness and no distention, guarding, rebound tenderness, masses, hepatomegaly, or splenomegaly. Because the quality and severity of the abdominal pain evolved significantly after initiation of oral antibiotics, the pediatrician refers her to the emergency department (ED) for further investigation and management.

In the ED, urinalysis shows trace leukocyte esterase, negative nitrites, with 1+ blood and trace ketones; there are 6 white blood cells/HPF on microscopy. Results of a complete blood cell count, C-reactive protein level, erythrocyte sedimentation rate, and quantitative  $\beta$ -human chorionic gonadotropin pregnancy test are normal and negative. The ED physician performs focused bedside transabdominal ultrasonography, and the gynecologist performs a pelvic examination with nonspecific

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findings. After the ED evaluation the gynecologist triages the patient to the operating room owing to a high suspicion of a surgical condition.

## DISCUSSION

### Differential Diagnosis

In women of reproductive age with acute pain over the lower abdomen and pelvic area, the differential diagnosis includes gastrointestinal (gastroenteritis, appendicitis, irritable bowel syndrome, diverticulitis, inflammatory bowel disease, constipation, bowel obstruction, and ischemic bowel), urinary tract (cystitis, pyelonephritis, nephrolithiasis), and gynecologic conditions. In this setting of acute abdominal pain while being treated for a UTI and history of a large ovarian cyst, a gynecologic condition is now suspected. In addition, a nonappropriately treated pyelonephritis or ureteral stone could be the cause; however, the patient does not have renal colic or flank pain, and the physical examination findings are negative for costovertebral angle tenderness.

Because ruling out pregnancy-related disorders is important, a point-of-care pregnancy test is imperative early in the evaluation of reproductive-aged women with acute pelvic and abdominal pain. When negative, providers can rule out ectopic pregnancy and threatened or spontaneous abortion. Reproductive tract infections, including pelvic inflammatory disease or tubo-ovarian abscess, can cause pelvic pain and may also include abnormal or foul-smelling vaginal discharge, pain with intercourse, vaginal pruritus, or abnormal uterine bleeding. Patients may have fever, chills, or vomiting. On pelvic examination, patients may have cervical motion, uterine, or adnexal tenderness.

Noninfectious issues of the reproductive tract include masses, ovarian torsion, or ovarian cysts. Ovarian torsion presents with acute onset of lower abdominal or pelvic pain, nausea, vomiting, or abnormal vaginal bleeding and requires early detection and treatment to preserve the ovary and reduce adverse effects on fertility. Patients may appear to be in significant pain or distress. Ovarian cysts may be symptomatic or asymptomatic, and symptoms include dull or sharp pain or pressure in the pelvic area on the side of the cyst. With rupture, there is usually sharp and focal pain, with fever, vomiting, or vaginal bleeding. On examination there may be a palpable abdominal or adnexal mass, localized tenderness, rebound tenderness, or guarding.

For reproductive tract concerns, the pelvic examination is essential to assess the anatomy and rule out certain infections and conditions mentioned previously herein.

Ultrasonography is the next diagnostic step if the provider cannot make a clear diagnosis after a detailed history and physical examination or to confirm some of the diagnosis. The results of the history, examination, and ultrasonography led to surgical exploration.

### Actual Diagnosis

The gynecologist performed an exploratory laparoscopy and found a 9-cm simple-appearing cyst arising from the left adnexa. The left ovary had torsed around its pedicle twice. The gynecologist manually detorsed the ovary and incised the ovarian cyst, with immediate expulsion of serous fluid. Within the cyst, there was a small pocket of sebaceous-appearing material. Pathology showed a pink transparent membranous tissue fragment and a fibroadipose tissue fragment with sebaceous material and black hair consistent with a dermoid cyst.

### The Condition

Ovarian torsion is a rare but serious medical condition occurring mostly in adolescents and young women, (1)(2) although it may affect females of all ages (2)(3)(4)(5)(6) with unknown incidence and may be difficult to diagnose because most symptoms are nonspecific. (1)(2)(7)(8)(9) Ovarian torsion occurs when the ovary rotates around the infundibulopelvic and utero-ovarian ligaments. Preexisting pathology, such as a cyst or neoplasm, is the most common cause of ovarian torsion. (2)(10) Torsion can occur with a mass of any size (11)(12); as size increases, the risk of torsion increases, with more than 80% of torsed ovaries (including the mass on/in the ovary) measuring at least 5 cm. (1)(3)(13)(14)

For premenopausal women, ovulation, mature cystic teratoma (ovarian dermoid cysts), polycystic ovary syndrome, endometriosis, pregnancy, pelvic infections, and cancer (15)(16)(17) may increase the risk of developing ovarian cysts. Dermoid cysts containing mature tissue from ectoderm, mesoderm, and endoderm are common tumors during the reproductive period. (18) Ovarian dermoid cysts are believed to form because of either failure of meiosis II or from a premeiotic cell in which meiosis I has failed. (19) They are unilateral in most cases. (20) In a paper including 517 cases of mature cystic teratoma, most people (60%) were asymptomatic. However, torsion can happen (3.5%). (21) The diagnosis can be made through ultrasonography, which shows characteristic findings of shadowing echodensity, regional diffuse bright echoes, hyperechoic lines and dots, and fat-fluid level. (22) Definitive diagnosis is made at the time of surgical excision.

Timely diagnosis of ovarian torsion is important to avoid vascular compromise, ischemia, and subsequent infertility. With 1 ovary, the fertility potential is not generally reduced; however, women with a single ovary may have a shorter reproductive life span because the number of follicles in the ovary is finite and there is no compensatory mechanism for the loss of 1 ovary. (23) On examination there may be a palpable adnexal mass, localized tenderness, rebound tenderness, or guarding. (8)(13) The patient may appear to be in significant pain or distress. Ovarian torsion can mimic other common diagnoses, (2)(10) making the combination of history, physical examination, laboratory data, and imaging studies particularly important.

The first-line imaging modality is ultrasonography. If possible, obtain both transvaginal and transabdominal ultrasonography to best visualize pelvic structures and abdominal processes and a color Doppler analysis (24) to assess blood supply. Ultrasonography shows the location, size, density, and components of ovarian masses; can detect ovarian torsion and blood flow alterations; and may assist in ruling out other pathologies. Ultrasonography findings consistent with torsion include an enlarged and rounded ovary due to edema or vascular and lymph engorgement, (25)(26)(27) free fluid in the pelvis (cul-de-sac fluid), (26)(28) thickening of a cyst wall, and a twisted pedicle. (24) Spectral Doppler ultrasonography often shows decreased blood flow in the vessels of a torsed ovary. (9)(24)(29) Abnormal Doppler flow identifies ovarian torsion, but normal blood flow cannot exclude torsion. (2)(6) Magnetic resonance imaging and computed tomography findings are similar to ultrasonography findings but are not first-line studies for ovarian torsion due to cost, logistics, and potential delays in diagnosis.

### Treatment

The definitive diagnosis and treatment for ovarian torsion is surgical, preferentially laparoscopic, (30)(31)(32) because it is associated with a greater degree of patient comfort, less postoperative morbidity, shorter hospital stay, and less analgesic drug use. (32)(33)(34) During surgery the viability of the

ovary is made by gross inspection. If the ovary looks dark (black-bluish ischemic) and enlarged (vascular and lymphatic congestion), it is likely still viable after detorsion. (10)(30)(35)(36)(37) A nonviable ovary appears necrotic, with loss of normal anatomical landmarks. Detorsion with ovarian conservation is the preferred treatment; however, salpingo-oophorectomy (10)(14)(30)(38)(39)(40) is warranted in the setting of suspected malignancy or a nonviable ovary. Several studies have shown that gynecologists are more likely to perform ovarian-conserving surgery than pediatric surgeons. (41)(42)(43)

### Patient Course

After surgical detorsion, she recovered uneventfully, returning to normal activities within 10 days.

### Lessons for the Clinician

- Early recognition of ovarian torsion is crucial to salvage the organ and reduce any adverse effects on future fertility.
- An ovarian cyst is the most likely predisposing factor to ovarian torsion. In general, torsion is most likely to occur when the ovary is 5 cm in diameter or larger.
- Consider ovarian torsion in girls and young women with known ovarian cysts who present with acute abdominal pain, even if the patient had some other diagnosis justifying the presentation.
- The pelvic examination is important even if the patient is not sexually active to rule out some conditions (such as trauma, foreign body, infection, blind vaginal pouch, and imperforate hymen) that may not be assessed with imaging or laboratory tests. This can be done if you take the time to build rapport and have a gentle approach. Consider the use of a child life specialist or similar ancillary staff to support the patient during this examination.

References for this article can be found at <https://doi.org/10.1542/pir.2021-005092>.