

# Just the Facts: Ovarian torsion in the emergency department setting

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### CLINICAL SCENARIO

A 23-year-old female presents with right lower quadrant pain that has been intermittent for the past several days. The pain suddenly worsened 1 hour ago. She denies vaginal bleeding or discharge, dysuria, fever, and back pain, but she has had several episodes of nausea with nonbloody, nonbilious vomiting. On examination, she is tender in the right lower quadrant, but her abdomen is not rigid.

### KEY CLINICAL QUESTIONS

## 1. Does ovarian torsion only occur in women of reproductive age?

Ovarian torsion predominantly affects reproductive-aged women, with a mean age of 30 years. The most common risk factor for ovarian torsion is an adnexal mass > 5 cm (80% of all patients),<sup>1-3</sup> but the absence of an ovarian mass or cyst does not exclude torsion. Other risk factors include prior fertility therapies, history of ovarian torsion or tubal surgery, and polycystic ovarian syndrome.<sup>1-3</sup> Close to 15% of all ovarian torsion cases occur in pediatric patients, and over half of these patients have normal ovaries.<sup>2,4</sup> Postmenopausal patients account for 15% of cases, most commonly associated with an ovarian mass, and 10–25% of cases occur in pregnant women, typically in the first trimester.<sup>5,6</sup>

## 2. Does ovarian torsion present with predictable symptoms?

The classic presentation of ovarian torsion is abrupt, severe, lower abdominal pain with nausea and vomiting, but the presentation is variable.<sup>2,3,7</sup> No one historical or physical examination finding should be used in isolation or in combination to rule in or out the diagnosis. Over 90% of patients have some form of abdominal pain, but abrupt pain occurs in less than 60% of patients.<sup>2,3,7</sup> Approximately 70% of patients experience nausea and vomiting, and fever may occur in 2–20%.<sup>2,3,7</sup> Pediatric patients may present with irritability and feeding intolerance.<sup>1,3</sup> However, much of the literature evaluating these findings consists of small sample sizes from different settings and populations.

## 3. How reliable is the abdominal and pelvic examination in the evaluation for suspected ovarian torsion?

Similar to the history, physical examination is not reliable for diagnosis. Most patients have abdominal pain and tenderness to palpation, but up to 30% of patients will not have tenderness on abdominal or pelvic examination.<sup>2,7</sup> While a significant risk factor for ovarian torsion is an ovarian cyst or mass, pelvic examination demonstrates poor sensitivity in detecting a mass, and obesity and age > 55 years further reduce the reliability of the examination.<sup>8,9</sup> While the pelvic

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examination should not be used to rule in or rule out the diagnosis, it may be useful when considering alternatives in the differential diagnosis.

#### 4. Can a pelvic ultrasound with normal arterial flow exclude the diagnosis of ovarian torsion?

The first-line imaging modality for evaluation of suspected ovarian torsion is ultrasound, either transabdominal in pediatric or virginal patients or transvaginal in other populations. Ultrasound can be used to rule in the disease, but it should not be used to rule out ovarian torsion, as the sensitivity ranges from 35% to 85%.<sup>1,10,11</sup> However, studies evaluating ultrasound for diagnosis of ovarian torsion suffer from several limitations, including poor sample sizes, different gold standards for diagnosis, and heterogenous imaging findings. The most common finding on ultrasound with gray-scale imaging is an enlarged, edematous ovary. The whirlpool sign, consisting of a hyperechoic structure with multiple inner hypoechoic rings wrapped around a central axis, is pathognomonic for torsion.<sup>11</sup> Other findings on ultrasound suggestive of torsion include displacement of the affected ovary toward the midline, peripherally displaced follicles with an afollicular stroma, and a hypoechoic ovary.<sup>1,10,11</sup> Doppler may demonstrate reduced or absent venous flow, and in later stages of torsion, absent arterial flow may be found.<sup>10-13</sup> However, arterial flow is normal in 25% of cases and will be present in over 50% of ultrasound examinations.<sup>12,13</sup> The combination of an enlarged ovary, any abnormal Doppler flow, and free pelvic fluid is associated with high specificity and positive predictive value for the diagnosis of ovarian torsion.<sup>10,11</sup>

#### 5. What findings on CT suggest ovarian torsion?

While ultrasound is the recommended first-line imaging test for suspected torsion, CT with intravenous (IV) contrast may demonstrate findings consistent with ovarian torsion, particularly a twisted vascular pedicle, thickened Fallopian tube, abnormal ovarian enhancement, and an ovary with afollicular stroma with peripherally displaced follicles.<sup>10,11,13</sup> One small case-control study comparing ultrasound and CT found similar diagnostic performance for diagnosis of ovarian torsion, although it is limited by its retrospective nature and small sample size.<sup>10</sup> Other findings that demonstrate high sensitivity for the diagnosis of ovarian torsion but are not specific include an adnexal mass or enlarged ovary, free pelvic fluid, uterine deviation toward the affected ovary, ovarian displacement toward the uterus, and inflammatory stranding surrounding the affected ovary.<sup>10,11,13</sup> If one of these less specific findings is present on CT, specialty consultation is recommended.

#### 6. Is there a definitive critical time of ischemia for the ovary?

Ovarian torsion is a time critical diagnosis, and suspicion of ovarian torsion based on history and examination warrants consultation with a gynecologist or surgeon, even if imaging is negative for torsion. Lymphatic and venous obstruction occur before arterial obstruction, and the ovaries possess dual vascular supply.<sup>2,14</sup> Thus, patients may experience symptoms of torsion, but arterial flow may not yet be compromised. Literature evaluating ovarian viability in the setting of torsion suggests patients may have a median of 3 days with symptoms (with a range of 0–60 days) and retain ovarian viability.<sup>2</sup> While ovarian torsion remains a time critical diagnosis, ovarian viability varies. The critical ischemia time for human ovaries is unknown, and the duration of symptoms should not determine whether the ovary is salvageable.

### SUMMARY/CONCLUSIONS

Ovarian torsion occurs with twisting of the vascular pedicle, resulting in ovarian ischemia and potentially necrosis. It may affect women of all ages and has a variable presentation. History and physical examination should not be used to exclude the diagnosis. Ultrasound is the first-line imaging modality, but if obtained, CT of the abdomen/pelvis may reveal several findings suggestive of ovarian torsion. Gynecology or surgery should be consulted if ovarian torsion is suspected.

**CASE RESOLUTION**

The emergency clinician provides antiemetics and analgesics to the patient. An ultrasound is obtained, which reveals an enlarged ovary, peripherally displaced follicles, and abnormal venous flow but normal arterial flow. The emergency clinician speaks with the gynecologist, who evaluates the patient and takes her to the operating room based on the history, examination, and ultrasound.



# Ovarian Torsion Pearls

## Just the Facts



### #1: Ovarian torsion affects all ages

- Most common population is reproductive-aged women, but pediatric, elderly, and pregnant patients are also affected



### #2: History and exam are not reliable

- Abdominal pain, vomiting, and tenderness are not present in all patients; pelvic exam is unreliable in detecting masses or tenderness



### #3: US with normal arterial flow cannot exclude torsion

- Compromised arterial flow does not occur until later in disease course; look for mass/cyst, ovarian edema, gray scale, venous flow, pelvic free fluid



### #4: CT may demonstrate findings of torsion

- While not the first-line modality, CT may show twisted vascular pedicle, thickened fallopian tube, abnormal enhancement, ovary with a follicular stroma/peripheral follicles



### #5: There is no definitive ovarian ischemia time

- Consult specialist regardless of symptom duration prior to imaging if history and exam suggest torsion

**Infographic.** Ovarian torsion pearls.

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## REFERENCES

1. Varras M, Tsikini A, Polyzos D, et al. Uterine adnexal torsion: pathologic and gray-scale ultrasonographic findings. *Clin Exp Obstet Gynecol* 2004;31:34–38.
2. Houry D, Abbott JT. Ovarian torsion: a fifteen-year review. *Ann Emerg Med* 2001;38:156–159.
3. White M, Stella J. Ovarian torsion: 10-year perspective. *Emerg Med Australas* 2005;17:231–237.
4. Karaman E, Beger B, Çetin O, Melek M, Karaman Y. Ovarian torsion in the normal ovary: a diagnostic challenge in postmenarchal adolescent girls in the emergency department. *Med Sci Monit* 2017;23:1312–1316.
5. Bouguizane S, Bibi H, Farhat Y, et al. Adnexal torsion: a report of 135 cases. *J Gynecol Obstet Biol Reprod* 2003;32:535–540.
6. Chiou SY, Lev-Toaff AS, Masuda E, et al. Adnexal torsion: new clinical and imaging observations by sonography, computed tomography and magnetic resonance imaging. *J Ultrasound Med* 2007;26:1289–1301.
7. Huchon C, Panel P, Kayem G, et al. Does this woman have adnexal torsion? *Hum Reprod* 2012;27:2359–2364.
8. Close RJ, Sachs CJ, Dyne PL. Reliability of bimanual pelvic examinations performed in emergency departments. *West J Emerg Med* 2001;175:240–244.
9. Ueland FR, DePriest PD, DeSimone CP, et al. The accuracy of examination under anesthesia and transvaginal sonography in evaluating ovarian size. *Gynecol Oncol* 2005;99:400–403.
10. Swenson DW, Lourenco AP, Beaudoin FL, et al. Ovarian torsion: case-control study comparing the sensitivity and specificity of ultrasonography and computed tomography for diagnosis in the emergency department. *Eur J Radiol* 2014;83:733–738.
11. Wilkinson C, Sanderson A. Adnexal torsion -- a multimodality imaging review. *Clin Radiol* 2012;67(5):476–483.
12. Nizar K, Deutsch M, Filmer S, et al. Doppler studies of the ovarian venous blood flow in the diagnosis of adnexal torsion. *J Clin Ultrasound* 2009;37:436–439.
13. Chiou SY, Lev-Toaff AS, Masuda E, et al. Adnexal torsion: new clinical and imaging observations by sonography, computed tomography and magnetic resonance imaging. *J Ultrasound Med* 2007;26:1289–1301.
14. Ghandehari H, Kahn D, Tomlinson G, Glanc P. Ovarian torsion: time limiting factors for ovarian salvage. *Emerg Med (Los Angel)* 2015;5:5.