

# Index of Suspicion

## 4 1 Month of Constipation and Abdominal Pain in a 2-year-old Girl

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### PRESENTATION

A 2-year-old girl with no significant medical history presents to the pediatric emergency department (ED) with a 1-month history of decreased frequency of bowel movements and hard stools. She had intermittent abdominal pain during this time as well.

She was brought to her pediatrician as well as multiple EDs, where radiographs were obtained and showed "constipation," according to her parents. Her parents had been consistently giving the patient a bowel regimen, but she continued to get worse. In the past week she had intermittent nausea and nonbloody, nonbilious vomiting. She also complained of 1 day of dysuria and decreased urine output.

In the ED her vital signs are as follows: temperature, 99.3°F (37.4°C); heart rate, 130 beats/min; respiratory rate, 26 breaths/min; blood pressure, 114/79 mm Hg; and oxygen saturation, 98% on room air. She is tired appearing, with dry mucous membranes. Her abdomen is soft, mildly tender with palpation in the suprapubic region, nondistended, and without palpable masses or hepatosplenomegaly. Rectal examination reveals normal tone and no stool present in the rectal vault. Urine dipstick analysis is significant for specific gravity greater than 1.030, ketone levels greater than 160 mg/dL, and trace leukocyte esterase. Initial screening laboratory tests include a complete blood cell count, basic metabolic panel, and lactate dehydrogenase and uric acid levels, the results of which are all normal.

Abdominal and pelvic ultrasonography shows a heterogeneous oblong mass in the expected right ovary location (Fig 1), with slight color Doppler flow (Fig 2). The left ovary is visualized with normal Doppler flow. Abdominal/pelvic computed tomography shows an oblong soft tissue mass posterior to the uterus measuring 4.2 × 3.4 × 2.2 cm (Fig 3). The right ovary is difficult to visualize but potentially is seen along the edge of this mass. The left ovary appears normal. Portions of the appendix are visualized and appear normal.

### DISCUSSION

We present a case of a 2-year-old girl who was given a diagnosis of constipation by multiple practitioners over a 1-month period before receiving a final acute surgical diagnosis of ovarian torsion. The presentation of our patient highlights the difficulties in distinguishing this entity from other, more common diagnoses in young children.

**AUTHOR DISCLOSURE** Drs Pade and Waterhouse have disclosed no financial relationships relevant to this article. This commentary does not contain a discussion of an unapproved/investigative use of a commercial product/device.

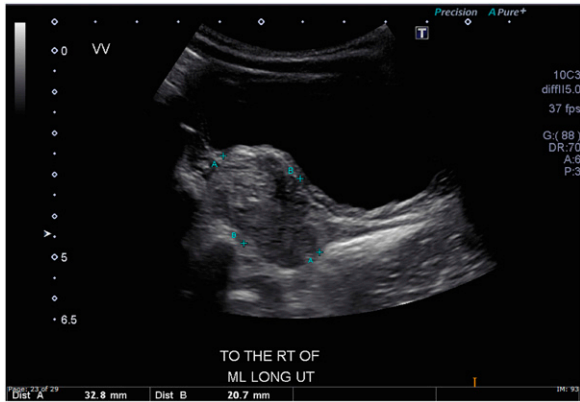


Figure 1. Abdominal/pelvic ultrasonography demonstrating a heterogeneous oblong mass in the right adnexa.

Although ovarian torsion in young children is far less common than alternative diagnoses, such as constipation and gastroenteritis, it does occur. Nonspecific symptoms, infrequency of the diagnosis in this age group, and young children's inability to describe the exact nature or location of their pain all pose a special challenge to clinicians.

In our patient's case, the abrupt nature of her change from normal to abnormal stooling patterns, as well as her physical examination showing mild-moderate dehydration, were the primary reasons for initiating an expanded evaluation that included laboratory tests and imaging.

Our patient was taken to the operating room immediately for removal of the right ovarian mass. On entering the abdomen, her right ovary was found to be necrotic and torsed, but without an associated mass. It was detorsed approximately 540° but did not regain blood flow. An oophorectomy was then performed.

### The Condition

Ovarian (adnexal) torsion is rare in the pediatric ED, with an incidence of 0.5 to 2 per 10,000 patients. (1)(2) It accounts

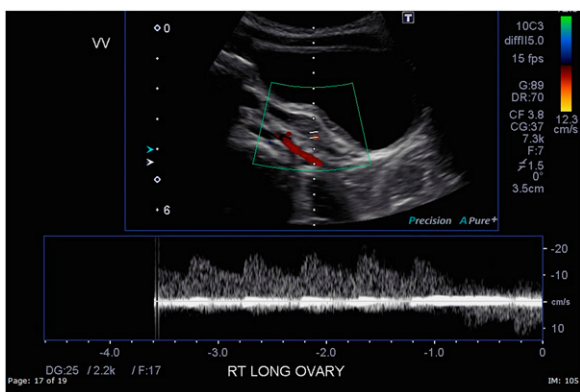


Figure 2. Abdominal/pelvic ultrasonography demonstrating Doppler flow to the right adnexal mass.



Figure 3. Abdominal/pelvic computed tomography demonstrating an oblong soft tissue mass posterior to the uterus.

for approximately 0.02% of children and adolescents presenting to the ED with acute abdominal pain. (3)

Ovarian torsion is classically recognized as having a bimodal peak in incidence in neonates and adolescents, (4) with a mean age in pediatric patients of 12.5 years. (3)(5) However, numerous case reports exist of young children with torsion, (6)(7) and its true incidence in preschool-age children is not precisely known. In a large retrospective cohort analysis using the Healthcare Cost and Utilization Project Kids' Inpatient Database of 3,356 children with ovarian torsion, the incidence in 1- to 5-year-olds was 2%, and 17% of patients were prepubertal (<12 years old). (1) However, a recent literature review of 14 studies involving 663 pediatric torsion episodes found that 43% were in premenarchal females, (8) and another series of 51 cases of pediatric ovarian masses undergoing surgical exploration found that 12% of patients were younger than 6 years. (9) These studies suggest that the true incidence in preschool-age patients may, in fact, be higher than previously thought. If premenarchal children have a higher degree of intermittent or recurrent torsion in otherwise normal ovaries, as has been hypothesized, (10)(11)(12) it makes sense that torsion may be an underreported diagnosis because some cases may be mistakenly attributed to other transient diagnoses, such as constipation or gastroenteritis.

Torsion is frequently associated with adnexal pathology, including tubal cysts, follicular cysts, cystic teratomas, and mucinous or serous cystadenomas. (13) Hypotheses for mechanisms by which a normal ovary torses include tubal spasm, abrupt changes in intra-abdominal pressure (due to vomiting or coughing), elongation and tortuosity of the tube

or mesosalpingeal vessels, or congenitally long supportive ligaments. (14) As the ovary torses, venous and lymphatic circulation is occluded, and if unrelieved, leads to occlusion of the arterial circulation. (5) The ovary rapidly becomes necrotic and gangrenous and may become infected, causing peritonitis. (5)

### Differential Diagnosis

Acute appendicitis is the most common diagnosis on the differential for ovarian torsion, particularly given the right-sided predominance of torsed ovaries. (2)(15) Other diagnoses to consider include constipation, gastroenteritis, urinary tract infection, ovarian cyst, pregnancy, or ectopic pregnancy. (2)(15)(16)(17) In preschool-age patients, intussusception, transient synovitis, inguinal hernia, constipation, and Wilms tumor or neuroblastoma should also be considered.

Although most pediatric abdominal pain complaints are due to benign causes, approximately 5% to 10% of pediatric patients with abdominal pain have true organic disease. (18) Constipation is the most common etiology for pediatric abdominal pain, causing 20% to 48% of cases (19)(20); however, constipation occasionally is the initial diagnosis in a patient ultimately diagnosed as having a different condition, such as appendicitis. (21) A study by Chang et al (22) suggests that a low Alvarado score with lack of pain migration, rebound pain, or fever may aid in clinically differentiating torsion from acute appendicitis. Laboratory values may be significant for mild leukocytosis (white blood cell count, 11,000–13,000  $\pm$  500/ $\mu$ L [11–13  $\pm$  0.5  $\times$  10<sup>9</sup>/L]), which is, on average, lower than in patients with appendicitis. (22)

### Diagnosis

Diagnosis of ovarian torsion in children requires a high index of suspicion because its presentation may not be classic. Pediatric patients may have a history of recurrent pain over several weeks (22) or other symptoms, such as fever and dysuria, which are traditionally ascribed to urinary tract infections. On physical examination, abdominal tenderness and rebound pain is most common, but pain may also be mild and diffuse, as was the case with our patient.

Although the diagnosis of ovarian torsion is clinical, pelvic ultrasonography is standardly performed when ovarian pathology or torsion is being considered, especially given concerns of radiation exposure in children. (3) The most frequent finding is an enlarged, heterogeneous ovarian or adnexal mass, (2)(23)(24) dilated peripheral follicles swollen with transudative fluid from the congested ovary, (23) or free intraperitoneal fluid. (25) Ultimately, edema and congestion progress, causing a decrease in venous and/or arterial blood flow to the affected ovary. (26) Lack of arterial

flow taken alone, however, is an insensitive predictor of torsion because normal arterial flow may be seen in up to two-thirds of patients. (8)(23) In a literature review of more than 650 pediatric ovarian torsion cases, the overall sensitivity of ultrasonography was 79% (95% CI, 73.7%–84.3%), (8) indicating that a percentage of patients will lack definitive ultrasonography evidence of torsion. On comparison of ultrasonography with computed tomography, the latter has low overall sensitivity for the diagnosis of pediatric ovarian torsion. (27)

### Treatment/Management

Because the overall sensitivity of ultrasonography for ovarian torsion is low, if the clinical presentation is suggestive, laparoscopy may be proposed as diagnostic. (8)(28) In the past, an oophorectomy was performed in pediatric patients if the ovary appears necrotic. This was due to concern for malignancy, adhesive disease, and increased risk of venous thrombosis and bowel obstruction. (5)(13) However, recent literature supports more conservative management, which includes detorsion with or without cystectomy and preservation of the adnexa (even if necrotic-appearing or concern for malignancy). (13)(29) Studies have shown that in cases concerning for malignancy, detorsion without immediate oophorectomy allows for diagnostic evaluation before definitive staging and treatment. (30) Also, ovarian-sparing operations (even in necrotic-appearing ovaries) can result in ovarian preservation and future follicular development. (30)(31)(32) Laparoscopy is typically preferred to laparotomy due to shorter hospital stays, fewer febrile morbidities, and less analgesic requirement after the operation; however, laparotomy may be required for significant ovarian enlargement. (31)(33)

### Patient Course

Our patient recovered from surgery well, tolerated oral intake, and was discharged on hospital day 2. Pathologic examination showed the right ovary and fallopian tube with extensive hemorrhage consistent with torsion and no evidence of malignancy.

### Lessons for the Clinician

- Although ovarian torsion is infrequent in young girls, studies have shown that it may be more common than previously thought and should be on every clinician's differential diagnosis for abdominal pain.
- Many young children lack typical signs and symptoms of ovarian torsion, especially when intermittent torsion is suspected, and the clinician should remain vigilant for this diagnosis even in relatively well-appearing young children.

- A low Alvarado score may aid in clinically differentiating torsion from acute appendicitis.
- Ovarian torsion is a clinical diagnosis, although pelvic ultrasonography may aid in diagnosis or to assess for associated pathology.
- Diagnostic laparoscopy is sometimes required to adequately and accurately diagnose ovarian torsion.

*References for this article are at <http://pedsinreview.aappublications.org/content/41/7/369>.*

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