A 15-Year-Old Obese Girl with Abdominal Pain

Robert Listernick, MD

An 15-year-old obese girl was seen for evaluation of 2 days of abdominal pain. Initially in her back, the pain migrated to her right lower quadrant. She had a single episode of nonbloody, nonbilious emesis the day before admission. Bowel movements were normal and she had been urinating normally. There was no history of fever. She had experienced similar pain around the time of her menses in the past but not to this degree. Her last menses ended the day prior to this visit and was 5 days in length without heavy bleeding. She denies any vaginal discharge.

Her past medical history was noncontributory. The family history is significant for multiple women on her mother’s side who had menorrhagia, including her mother who had undergone a hysterectomy at age 40 years due to heavy bleeding. The maternal grandmother had endometrial cancer and thrombus in her lower extremity associated with this cancer.

The patient was not sexually active and was not taking any medications.

On examination, her vital signs were unremarkable. Her weight was 118 kg. Her abdomen was soft but tender to palpation in the right lower quadrant without rebound tenderness or guarding. Her physical development was Tanner stage 5. No bimanual or speculum examination was performed (I was surprised by this); rectal examination was normal with hemoccult-negative stool.

She had normal hemoglobin, and white cell blood count of 15,000/mm³ with 80% neutrophils. Comprehensive metabolic panel was normal, urinalysis had 3+ blood and numerous red blood cells on microscopic analysis, and pregnancy test was negative.

Robert Listernick, MD, moderator: Can we see the radiology?

Ellen Benya, MD, pediatric radiologist: She actually had a computed tomography (CT) scan performed first and then had an ultrasound. The ultrasound revealed a large fluid-filled cystic structure in the lower abdomen and pelvis measuring 22 cm × 12 cm × 15 cm. We couldn’t convincingly see a normal right ovary. There was also a significant amount of free peritoneal fluid.

Robert Listernick: What was your initial differential diagnosis?

Benya: We felt that it was a large right ovarian or adnexal cystic lesion. Because we didn’t see any fat or calcification within the lesion, we thought an ovarian teratoma was less likely. We couldn’t comment on blood flow to the lesion to determine whether it was undergoing torsion.

Robert Listernick: Should a CT scan have been the first test performed?

Jennifer Trainor, MD, pediatric emergency department physician: In general, if one is concerned about adnexal structures such as ovarian cysts or torsion, ultrasonography is the appropriate first step. In addition, the first-line test for diagnosing uncomplicated appendicitis would be ultrasonography. As with most diagnostic tests, your decision to choose between tests should, in large part, be based on your most likely diagnoses.

Robert Listernick: Would her obesity interfere with making a diagnosis?

Trainor: We have unpublished data that we’re still analyzing that shows no difference in our ability to diagnose appendicitis based on weight.

Rashmi Kabre, MD, pediatric surgeon: When I first saw her, she was extremely sensitive to palpation...
in the right lower quadrant. My immediate concern was that she had an adnexal lesion undergoing torsion. I would add that our differential diagnosis of cystic abdominal masses besides adnexal lesions includes omental or mesenteric cysts, choledochal cysts, and enteric duplications. The latter would have a different appearance on ultrasound than this lesion. As Dr. Benya stated, we strongly suspected that this lesion was an ovarian or paratubal cyst. We told the family that this should be performed as an open surgery rather than via laparoscopy.

**Dr. Listernick:** Why?

**Dr. Kabre:** This cyst went above the level of the umbilicus. We were afraid of rupturing it by inserting the trocar, particularly if it were of ovarian origin. There’s a small but real chance of this being a mucinous cystadenoma, which if you spill the fluid may cause the tumor to seed the peritoneum.

**Dr. Listernick:** What did you find?

**Dr. Kabre:** This was a large paratubal cyst. The entire right adnexa, including the ovary and fallopian tube, had undergone complete torsion. It was completely purple. We untwisted it, keeping the cyst intact in the unlikely event that it was a malignancy. We were able to spare the fallopian tube and ovary on that side. She also had a small 3-cm paratubal cyst on the contralateral side that we removed. It’s interesting that her sister also had a laparotomy for a similarly sized paratubal cyst.

**Dr. Listernick:** Moving forward, 24 hours after surgery it was noted that her left calf and thigh had become warm and edematous. She didn’t complain of pain. Capillary refill was brisk, pulses were normal bilaterally, and she had a negative Homan’s sign.

**Dr. Benya:** Ultrasonography revealed echogenic material in the left iliac vein with decreased blood flow that had low velocity and a flat waveform. These findings are diagnostic of a fairly large, nearly occlusive deep venous thrombosis (DVT).

**Dr. Listernick:** Do we routinely give preoperative anticoagulant prophylaxis to high-risk patients?

**Tim Lautz, MD, pediatric surgeon:** If she were 2 years older and at an adult hospital, there’s no question, given her weight, that she would have received preoperative subcutaneous heparin or enoxaparin sodium. That’s generally not the standard of care in pediatrics. The preoperative nurses go through a checklist; if the patients meet criteria for antithrombotic prophylaxis they get sequential compression devices, and this patient received them. Anticoagulant prophylaxis is left to the individual surgeon’s discretion.

**Anjali Sharathkumar, MD, pediatric hematologist:** Was the mass compressing the common iliac vein? This might have altered the decision-making about prophylaxis, as controversial as it is, even before surgery.

**Dr. Kabre:** Not surprisingly, the mass was partially compressing the inferior vena cava. I actually felt a thrombus in the right adnexal vein, a common finding in someone who had had symptoms this long. As such, at the time I didn’t feel that anticoagulant treatment was warranted.

**Robert Liem, MD, pediatric hematologist:** I don’t know the data but I wonder whether the risk of bleeding in pediatric patients who receive prophylaxis is different than in adults who have multiple comorbid conditions that contribute to their overall hypercoagulability.

**Dr. Sharathkumar:** It’s true in the adult world that any patient with cancer undergoing surgery would receive preoperative prophylaxis.

**Rukhmi Bhat, MD, pediatric hematologist:** Another confounding Panelists

Robert Listernick, MD
Moderator

Ellen Benya, MD
Pediatric radiologist

Jennifer Trainor, MD
Pediatric emergency department physician

Rashmi Kabre, MD
Pediatric surgeon

Tim Lautz, MD
Pediatric surgeon

Robert Liem, MD
Pediatric hematologist

Rukhmi Bhat, MD
Pediatric hematologist

Ranna Rozenfeld, MD
Pediatric critical care physician

Alexis Thompson, MD
Pediatric hematologist

Not pictured: Anjali Sharathkumar, MD, pediatric hematologist.

All panelists practice at the Ann & Robert H. Lurie Children’s Hospital of Chicago, IL, where this discussion, part of a weekly series, was recorded and transcribed for Pediatric Annals.
factor in this child’s care was that she had been in a great deal of pain for 2 weeks prior to presentation. She had not been going to school and had been lying around, fairly immobilized.

**Dr. Listerick**: Obviously, the management is highly debatable. Regardless, at this point, as she has a known symptomatic thrombus, how do we proceed?

**Dr. Bhat**: At this point, I would have recommended anticoagulation with enoxaparin sodium.

**Dr. Listerick**: She was given enoxaparin sodium, and on postoperative day 4 she developed right-sided chest pressure that she described as “feeling like her heart was beating fast and was skipping a beat.” She was found to be tachycardic and have an oxygen saturation of 85%. She had slightly decreased aeration in the right anterior lung field compared with the left anterior lung field; otherwise, her examination was normal. She was given supplemental oxygen therapy. Chest X-ray was normal and anti-Xa level was therapeutic. An immediate chest CT scan was performed.

**Dr. Benya**: The CT scan identified fairly sizeable thrombi in the right and left main pulmonary arteries, with multiple smaller thrombi in the vasculature of both lower lobes.

**Ranna Rozenfeld, MD, pediatric critical care physician**: She also had an echocardiogram and electrocardiogram at this point, looking for evidence of cardiac dysfunction and right heart strain. If it were present, it would be a useful marker to follow as a proxy for treatment efficacy.

**Dr. Liem**: It’s also useful in deciding how aggressive to be therapeutically.

**Dr. Bhat**: Most of the evidence-based guidelines are from the adult literature. For the small subset of patients with massive or submassive pulmonary emboli (PE) who present with shock or respiratory failure, immediate surgical thrombectomy or thrombolysis needs to be considered. This was not the case in our patient. She had normal blood pressure and good left ventricular function with no evidence of right ventricular dilatation. It should be remembered that the extent of thrombotic load on CT does not always correlate with the clinical severity of acute pulmonary embolism or its impact on right ventricular function. One could argue that evidence of the PEs represented a failure of clinical therapy and that we should be more aggressive with the anticoagulation, aiming for higher anti-Xa levels.

**Dr. Sharathkumar**: Although the ultrasonographer can’t identify the extent of the clot in the inferior vena cava, I suspect that there is clot present. We know that 20% to 30% of patients who have proximal DVTs will “throw” PEs, many of which are subclinical. For this reason, immobilized adult patients in intensive care units will always receive anticoagulation for 6 weeks after discharge.

**Dr. Listerick**: Is there any reason to attempt to identify subclinical asymptomatic PEs?

**Dr. Sharathkumar**: No. Treatment of PEs should be determined by the hemodynamic stability of the patient or the cardiac function, not by the radiology.

**Dr. Listerick**: How does fibrinolytic therapy enter the equation?

**Dr. Bhat**: Unfortunately, there are still no pediatric guidelines for the use of fibrinolysis. In the adult literature, the recommendation for fibrinolysis is only in the context of low blood pressure or right ventricular heart strain.

**Dr. Sharathkumar**: Fresh clots generally are very responsive to therapeutic anticoagulation. Once again, the main issue is whether the patient is hemodynamically stable. The decision to institute fibrinolytic therapy is quite complex and, in many ways, institution-dependent. In addition, the use of catheter-directed thrombolytic therapy (ie, delivery of the agent via catheter directly to the vessel with the clot) versus systemic thrombolytic therapy is quite complex. There aren’t sufficient data in children to compare. In my experience, pediatric hematologists tend to be more comfortable with catheter-directed thrombolytic therapy, particularly in postsurgical patients.

**Dr. Listerick**: I know that there was a great deal of discussion as to whether an inferior vena cava (IVC) filter should be placed to prevent further PEs.

**Dr. Kabre**: I chose to place an IVC filter. In the past, filters were permanent devices that remained for the patient’s lifetime. However, now they are retrievable, so they can be placed in the acute phase and then subsequently be removed. The plan was to remove it after 3 months if all went well.

**Dr. Bhat**: There are no published guidelines in pediatrics that help us decide when to place IVC filters. These are usually indicated in adults when there is a contraindication to anticoagulation or in the presence of severe bleeding. Our thoughts were that this child’s PEs were not the result of failed anticoagulation therapy and that they probably had been there from the onset of her DVT. We might have favored being more aggressive with anticoagulation, targeting higher levels of anti-factor Xa.

**Dr. Listerick**: What are the cons to placing an IVC filter?
**Dr. Bhat:** Risks include filter migration, extension of DVT, and accumulation of thrombus in the filter basket making retrieval difficult.

**Dr. Kabre:** I had a long discussion with the family about the pros and cons of placing a filter. They didn’t want to risk the chance of another clot causing a massive PE.

**Alexis Thompson, MD, pediatric hematologist:** This is a huge issue. For a variety of reasons, 95% of the IVC filters placed worldwide are never removed, even the removable ones, despite the best of intentions. The American Society of Hematology, as part of the “Choosing Wisely” campaign across medical specialties, has targeted this practice.

**Dr. Kabre:** Totally reasonable. However, I am taking responsibility that this particular girl’s filter will be removed as part of her surgical follow-up care. The patient, family, and I have all agreed to this upfront.

**Dr. Liem:** This was obviously a complex decision. When looking at the adult literature, the primary indication for placing IVC filters is in individuals in whom anticoagulation is contraindicated because of bleeding risk. Systematic reviews of the adult data don’t even support the notion that these filters prevent further PEs in adults, except for perhaps in trauma patients.

**Dr. Listernick:** I hope that clarifies the issue for everyone. Thanks.

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**Key Learning Points**

1. The first-line radiologic evaluation for diagnosing uncomplicated appendicitis would be ultrasonography.
2. Large cystic ovarian lesions should be removed intact on the small chance that they are mucinous cystadenomas that if ruptured might seed the peritoneum with tumor.
3. In pediatrics, the individual role of preoperative anticoagulation therapy, fibrinolytic therapy, and the placement of inferior vena cava filters is quite controversial and not evidence based.