

EM CASE OF THE WEEK.

BROWARD HEALTH MEDICAL CENTER
DEPARTMENT OF EMERGENCY MEDICINE



Care Warriors

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Pediatric Appendicitis

A 14-year old Hispanic female with a history of abdominal pain presents to the ED complaining of left lower quadrant abdominal pain that woke her up from her sleep. She has never experienced similar symptoms before. The pain is a constant, cramping-type pain that is a 10/10. It radiates to the middle of the lower abdomen. It is associated with nausea, vomiting, and decreased appetite. She took Motrin at home 2 hours ago, which helped minimally. Movement like walking worsens the pain. LMP was 1 month ago. She is afebrile. BP is 104/76. HR is 92. RR is 20. On physical exam, she is mildly diaphoretic and her LLQ is tender to palpation. No rebound or guarding. UA shows pyuria and hematuria; all other labs are WNL with WBC of 10700 cells/uL initially. Pelvic US is negative. CT of the abdomen and pelvis with PO and IV contrast shows an appendix measuring 11 mm in diameter with multiple appendicoliths. What is the initial management of this patient?

- Discharge on oral antibiotics.
- Consult on-call surgeon for emergent surgery.
- Refer to gynecology for further work up.
Discharge with instructions to continue OTC NSAIDs.
- Immediate IV hydration, analgesia, antiemetics, and antibiotics. Make patient NPO.
- Obtain additional imaging to rule out an intestinal malrotation or bowel obstruction.

CT acute appendicitis



Acute appendicitis. Images of the pelvis (A and B) from a CT with intravenous and oral contrast shows a thickened appendix (arrow) containing an appendicolith and surrounding fluid indicating inflammation.

CT: computed tomography.

Computed tomography signs of acute appendicitis

Wall thickness >2 mm
Appendicolith
Enlargement of the appendix
Target sign (concentric thickening of the appendiceal wall)
Phlegmon
Abscess
Free fluid
Thickening of the mesentery, fat stranding (peri-appendiceal inflammation)

EM Case of the Week is a weekly "pop quiz" for ED staff.

The goal is to educate all ED personnel by sharing common pearls and pitfalls involving the care of ED patients. We intend on providing better patient care through better education for our nurses and staff.

BROWARD HEALTH MEDICAL CENTER

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The correct answer is (D). This patient with stable vitals and labs has an early appendicitis consistent with the CT findings. Early appendicitis is defined as appendicitis without evidence of perforation.

Discussion

Appendicitis classically presents with dull periumbilical pain that lasts 1-12 hours before localizing to **sharp RLQ pain** at McBurney's point. It can present with nausea, vomiting, anorexia, and **low-grade fever**.

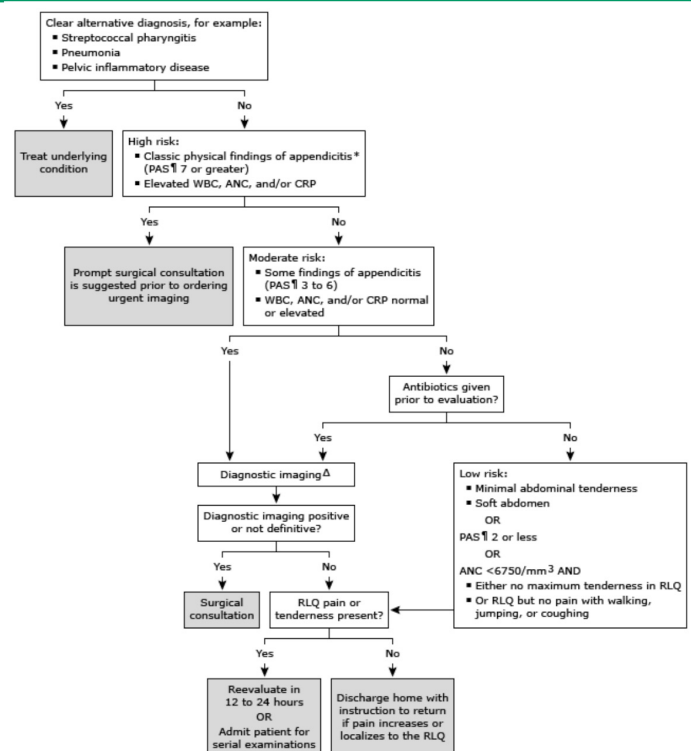
This patient's atypical presentation with cramping-type LLQ pain and lack of fever is suspicious for other etiology. However, CT scan confirms the diagnosis. The patient should immediately be placed as NPO in preparation for surgery. She should also receive IV hydration, analgesia, antiemetics, and antibiotics with anaerobic and gram-negative coverage. Immediate open or laparoscopic appendectomy is definitive treatment and should be performed within 24 hours of diagnosis. Timely appendectomy prevents the progression to rupture with peritonitis. Appendectomy also permits diagnosis of rare, but coexisting conditions such as carcinoid tumor or alternative diagnoses such as ovarian torsion that changes subsequent management.

The absence of classic signs of appendicitis in a pediatric patient should not cause the clinician to exclude the diagnosis of appendicitis. Although the classic pattern of clinical findings can occur in school-age children and adolescents, it is less common overall in pediatric patients than adults. Thus, diagnosing appendicitis, especially in its early stages, among children is frequently challenging and clinical findings often overlap with other conditions.

General approach

- Diagnosed by clinical impression.
- Look for low-grade fever, mild leukocytosis (11000-15000 cells/uL) with left shift, and UA with a few RBCs and/or WBCs.
- If the clinical diagnosis is unequivocal, no imaging studies are necessary. Otherwise, studies include the following:
 - CT scan with PO and IV contrast: Periappendiceal stranding or fluid; enlarged appendix; multiple appendicolith.
 - US: an enlarged, noncompressible appendix.

Diagnostic approach to pediatric appendicitis



For a list of educational lectures, grand rounds, workshops, and didactics please visit BrowardER.com and **click** on the **"Conference"** link.

All are welcome to attend!

Management

- Acceptable antibiotic choices for nonperforated appendicitis:
 - o Cefoxitin, ceftriaxone and metronidazole, cefotetan, gentamicin and either clindamycin or metronidazole in patients allergic to penicillins and cephalosporins, piperacillin and tazobactam.
 - o Should be administered as soon as the diagnosis is established and at least 30 to 60 minutes before incision.
- Fluid therapy:
 - o Rehydration is accomplished by giving 20 ml/kg boluses of isotonic crystalloid until signs of dehydration have resolved and patient has voided.
 - o Once euolemia has been established, the child should receive half normal saline with 10 to 20 mEq/L of KCl at 1 to 1.5 maintenance and addition fluid losses (eg, vomiting) should be replaced.
 - o Any electrolyte abnormalities should be corrected before surgery.
- Analgesia:
 - o Pain control is important both before and after diagnosis is made. IV opioids (eg, morphine) are typically best choice.
 - o Ketorolac is an excellent choice for postoperative pain control and does not increase bleeding risk.
- Timing of operation
 - o In the past, appendicitis was considered a surgical emergency. Evidence suggests that adverse outcomes (eg, perforation, complications) are not increased for children who receive timely administration of antibiotics and undergo appendectomy within 24 hours of diagnosis.
- Laparoscopic or open approach
 - o Laparoscopic approach is recommended for children with early appendicitis.
 - Performed using a three port or single incision technique.
- Postoperative care
 - o Postoperative pain management with parenteral opioids (eg, morphine with repeated doses every 4-6 hours based on pain assessment) supplemented by parenteral ketorolac or acetaminophen with conversion to oral agents once the child is drinking well.
 - o Oral fluids can be introduced as soon as the child is awake and diet may be advanced to solid as tolerated.
- Nonoperative management
 - o Although appendectomy is the treatment of choice, nonoperative treatment of early appendicitis may be an option depending on caregiver preference. It may be safe and effective for older children and have features as follows:
 - Abdominal pain <48 hours, WBC \leq 18000/microL, normal CRP, **No** appendicolith present on imaging, appendix diameter \leq 1.1 cm on imaging, no preoperative concern for rupture based on clinical findings.

Take Home Message

- The absence of classic signs of appendicitis in a pediatric patient should not cause the clinician to exclude the diagnosis of appendicitis.
- Look for low-grade fever, mild leukocytosis (11000-15000 cells/uL) with left shift, and UA with a few RBCs and/or WBCs.
- Give IV hydration, analgesia, antiemetics, and antibiotics with anaerobic and gram-negative coverage as soon as the diagnosis is made.
- Immediate open or laparoscopic appendectomy is definitive treatment and should be performed within 24 hours of diagnosis.
- Nonoperative management may be considered in certain patients based on caregiver preference.



ABOUT THE AUTHOR

This month's case was written by Raiyan Islam. She is a 4th year medical student at NSU-COM. She did her emergency medicine rotation at BHN in October 2019. Raiyan plans on pursuing a career in Internal Medicine after graduation.

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