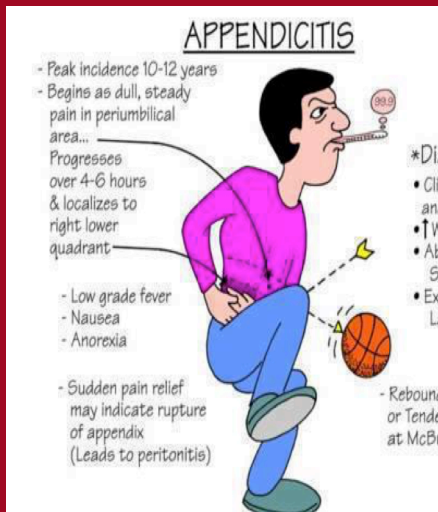


# EM CASE OF THE WEEK

BROWARD HEALTH MEDICAL CENTER DEPARTMENT OF EMERGENCY MEDICINE



**Appendicitis is the #1 surgical emergency in both pregnant and non-pregnant patients.**

**The lifetime risk for appendicitis is slightly higher for men than for women ( 8.6% and 6.7%, respectively).**

## EM CASE OF THE WEEK

EM Case of the Month is a monthly “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.



## Acute Appendicitis in the ER

A 20 y/o female with abdominal pain is evaluated in the ER. Pain is described as gradually worsening over the past 24 hours and is persistent in the lower abdomen. Shortly after the onset of pain, the patient developed nausea. She denies diarrhea, dysuria, or previous abdominal symptoms. Her LMP was 7 days ago. She is sexually active. Her past medical and surgical history is unremarkable. On physical exam her tempt is 100.8F with normal BP, HR, and RR. Her abdomen is soft, with tenderness to palpation in the right lower quadrant and suprapubic region. No masses are felt and bowel sounds are hypoactive. Pelvic exam reveals no purulent discharge; however, there is tenderness in the right adnexal region. Laboratory studies show a WBC count of 14,500, normal H/H, normal electrolyte and amylase levels. Urinalysis reveals concentrated urine with a few red and white blood cells, but no leukocyte esterase. Serum pregnancy test is negative.

What should be the next step in management of this patient?

- Obtain a CT scan of the abdomen and pelvis
- Obtain an ultrasonography of the abdomen and pelvis
- Clinical observation with serial laboratory studies
- Diagnostic laparoscopy

\*\*\* The overall mortality rate for appendicitis is less than 1%, but it increases to 3% if the appendix is ruptured and approaches 15% in the elderly\*\*\*



Broward Health Medical Center  
Department of Emergency Medicine  
1625 SE 3<sup>rd</sup> Ave  
Fort Lauderdale, FL 33316

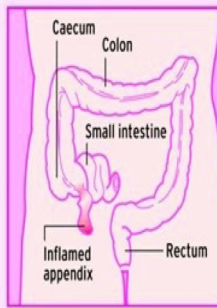


## Discovery

### Stomachache or something more?

Appendicitis has the same symptoms as many other childhood illnesses, such as flu. Some early signs of appendicitis:

- **Stomachache.** Pain around the navel that often shifts later to the lower-right abdomen.
- **Nausea** and sometimes vomiting
- **Loss of appetite**
- **A low-grade fever** that starts after other symptoms appear
- **Constipation**
- **An inability to pass gas**
- **Diarrhea**
- **Abdominal swelling**



## Appendicitis

**The correct answer is A.** This case shows a history of abdominal pain that is **atypical** for acute appendicitis. The diagnosis of acute appendicitis is frequently made on the basis of clinical history, physical findings, and laboratory data. **When a patient presents with an atypical history and atypical physical and/or laboratory findings, it is important to determine whether that presentation is related to another disease or to a possible atypical positioning of the diseased appendix.**

The CT is selected in this case because it is sensitive for identifying inflammatory changes and thickening of the appendix. This patient has fever, lower abdominal tenderness and an increased white blood cell count, which should result in radiographic changes. **Ultrasonography** is not favored as the physical exam and history are not suggestive of pelvic pathology. It is also a difficult US study to perform **Clinical observation with serial labs** is not a good option because she already has localized abdominal pain, fever, and leukocytosis, and therefore observation for regression of these symptoms would lead to a delay in diagnosis. **Diagnostic laparoscopy** is an operative procedure with associated morbidity and is mainly indicated for patients with nonspecific clinical or radiographic evidence of inflammation or pathology that cannot be further delineated by additional imaging studies.

## Take Home Points

The classic triad of anorexia, fever, and pain is not always seen in every appendicitis case.

Fever is a relatively late finding and is unreliable as an indicator for appendicitis.

Acute appendicitis can mimic virtually any intra-abdominal process, therefore, to know acute appendicitis is to know well the diagnosis of the acute abdomen.

Mesenteric adenitis is the # 1 alternate Dx (8-12%). It is a self-limiting inflammatory process that affects the mesenteric lymph nodes in the right lower quadrant, and is clinically often mistaken for acute appendicitis.

### Signs and Symptoms

1. **Pain in periumbilical area** with localized in 6-10h to right lower quadrant (distension of appendix causes visceral stretch receptors to tenth thoracic regions to be stimulated)
2. Pain localizes to right lower quadrant when parietal peritoneum becomes irritated
3. Point tenderness on palpation (usually McBurney's point, one-third of the distance from the anterior superior iliac spine to the umbilicus)
4. **Anorexia** and/or **vomiting** before onset of pain
5. Rebound and guarding on palpation (especially if ruptured)
6. Positive psoas sign (if appendix is in contact with psoas muscle)
7. Positive obturator sign (if appendix is in contact with pelvic rim)

*For a list of educational lectures, grand rounds, workshops, and didactics please visit*

*<http://www.BrowardER.com>*

*and click on the "Conference" link. All are welcome to attend !*



**Pathophysiology:** Acute appendicitis develops from obstruction of the appendicular lumen. Increased luminal pressure leads to vascular compromise, bacterial invasion, inflammatory response, and resultant tissue necrosis with possible perforation and peritoneal contamination. Classically, appendicitis is associated with the migration of pain from the periumbilical area to the right lower quadrant. However, there are many atypical presentation often affected by variability of the anatomic location (retrocecal, retroileal) of the appendix.

**Sounds Pretty Easy to Spot Right?** There are many conditions that may simulate appendicitis!

The ascending appendix (retrocecal or paracecal):

- Cholecystitis, Inflamed duodenal ulcer, Perforated gallbladder, Perinephric abscess, Hydronephrosis, Pyonephrosis, Pyelitis, Stone in the kidney, Torsion of the omentum

Iliac position of the appendix:

- Leaking duodenal ulcer, Crohn's, Carcinoma, Stone in ureter, Yersinia infections, Inflamed Meckel's diverticulum, Psoas abscess, Tuberculous hip disease

Pelvic position of the appendix:

- Intestinal obstruction, Diverticulitis with abscess, Gastroenteritis, Perforation of a typhoid ulcer

In Women:

- Ectopic gestation, Twisted pedicle of an ovarian cyst, Salpingitis, Ruptured follicular cyst, Ruptured corpus luteum cyst.

**Surgical Window:** How long do you have to get the patient to the OR before rupture? Interestingly, untreated appendicitis will occasionally resolve on its own over 6% of the time, as evidenced by prior scarring seen in surgically removed specimens. In a review of 56,000 cases where appendicitis was either treated conservatively (watch and wait) vs aggressively (OR immediately), there was an almost equal incidence of perforation, indicating there may not be such an urgency to get the patient to the OR. With that said, there is a **greater proportion of perforated appendicitis in the very young and very old**, likely due to the greater chance that the patient will present atypically.

#### Treatment:

Table 3. Antibiotics Used in the Management of Appendicitis

Drug	Dosage
<b>Penicillins</b>	
Ampicillin-sulbactam	Adolescents and children >40 kg: 1.5-3 g IV q6h up to a max daily dose of 4 g of sulbactam
Piperacillin-tazobactam	Adolescents and children >40 kg: 3.375 g IV q6h for 7-10 days Children and infants >9 mo: 100 mg/kg of piperacillin component IV q8h for 7-10 days Infants 2-9 mo: 80 mg/kg of the piperacillin component IV q8h for 7-10 days
Ticarcillin-clavulanate	Children and adolescents ≥60 kg: 3.1 g IV q4-6h Infants >3 mo, children, and adolescents <60 kg: 200 mg/kg/day ticarcillin component IV q6h up to a max of 300 mg/kg/day ticarcillin component IV q4h Full-term neonates and infants <3 mo: 50 mg/kg q4h
Imipenem-cilastatin	Children >3 mo: 15-25 mg/kg IV q6h; max 4 g/day Infants 4 wk-3 mo: 25 mg/kg IV q6h Infants 1-4 wk: 25 mg/kg IV q8h Infants <1 wk: 25 mg/kg IV q12h
<b>Other</b>	
Gentamicin	Children and adolescents: 2-2.5 mg/kg IV q8h Infants: 2.5 mg/kg IV q8h
Metronidazole	Adolescents: a loading dose of 15 mg/kg IV over 1 h followed by 7.5 mg/kg IV q6h Infants and children: 30 mg/kg/day IV given as 4 divided doses; max 4 g/day
Clindamycin	Adolescents: 300 mg IV q6-12h up to 2,700 mg IV per day Infants, children, and adolescents <16 y: 20-40 mg/kg/day IV divided over 3-4 doses
<b>Cephalosporins</b>	
Cefoxitin	Infants >3 mo, children, and adolescents: 80-100 mg/kg/day IV in divided doses q6-8 h, increased to 100-160 mg/kg/day IV in divided doses q4-6h; max 12 g/day
Cefotetan	Adolescents: 1-2 g IV q12h increased to 3 g IV q12h Children: 40-80 mg/kg/day IV in divided doses q12h; max dose of 6 g/day

max: maximum. Source: References 24-32.



**ABOUT THE AUTHOR:**  
This month's case was written by Joel Schoenberg. Joel is a 4<sup>th</sup> year medical student from NSU-COM. He did his emergency medicine rotation at BHMC in March 2015. Joel plans on pursuing a career in Emergency Medicine after graduation.