

# EM CASE OF THE WEEK.

BROWARD HEALTH MEDICAL CENTER  
DEPARTMENT OF EMERGENCY MEDICINE



Care Warriors

Author: Vikisha Hazariwala Editor: Ajith Susai D.O.

| Vol 5 | Issue 41

## Appendicitis

A 23-year-old male with no significant past medical history presents to the ED with severe abdominal pain that began 3 days ago but has progressively worsened since. He states that he experienced discomfort and a bloating sensation 3 days ago but currently localizes the pain to his right lower abdomen. He has vomited twice since the pain began and has had not eaten in two days. He denies hematemesis, hematuria, bloody stool. Vitals include a fever of 101 degrees F, a pulse of 92 and a pressure of 102/72. Clinical exam shows mild abdominal distension with right lower quadrant tenderness to palpation with rebound and guarding. What is the next best step in management of this patient?

- A. Non-contrast CT of the abdomen and pelvis.**
- B. Ultrasound of the abdomen.**
- C. IV access, labs, NPO & IVF, empiric antibiotics.**
- D. Digital rectal exam.**
- E. MRI of the abdomen**



Dilated and inflamed appendix on CT abdomen frontal plane. From [www.radiopaedia.org](http://www.radiopaedia.org).

Correct answer is C. Early antibiotics have been shown to halt the progression of appendicitis.

*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**

Department of Emergency Medicine  
1625 SE 3rd Avenue  
Fort Lauderdale, FL 33316

## Discussion

Appendicitis remains the most common acute care procedure done in the USA, with Americans having roughly a 7% lifetime risk of acquiring. Historically, it had a mortality of 26%, but that has gone down to 0.2% to 5% depending whether the appendix has perforated or not. Incidence is highest between ages 10 to 30 years.

The pathophysiology of appendicitis is related to luminal obstruction, resulting in venous congestion, edema and inflammation, tissue ischemia and infarction. Causes of obstruction include fecalith (50%), lymphoid hyperplasia, ingested foreign bodies, parasitic infection, and malignancy (about 1.1%, depending on age). Bacterial overgrowth results in a phlegmon, suppuration, and eventually gangrene with perforation and subsequent abscess formation. The classic presentation, as described by Dr. Reginald Fitz in 1886 and Dr. Zachary Cope in 1921, begins as vague, poorly localized periumbilical visceral pain due to a dilated appendix. As the inflamed appendix expands and contacts the parietal pleura, the pain migrates to the right lower quadrant, but the appendix may also be commonly found ascending behind the cecum or descending into the pelvis. Associated with this pain is often nausea, vomiting, loss of appetite, and eventually fever with a rigid and tender abdomen.

Following these physical symptoms, patients often develop a leukocytosis (around 75%), usually <24 hours after pain begins. Acute appendicitis, if untreated, will usually perforate, resulting in stool and purulent spillage into the abdomen. Peritonitis and abscess formation commonly follow perforation. Of note, children under 5 years of age often present with perforated appendicitis due to being poor historians.



Traditionally, appendicitis was a clinical diagnosis; in the absence of imaging, appendicitis is correctly diagnosed around 80% of the time. Non-contrast CT of the abdomen has a 98% accuracy in diagnosing appendicitis (appendix with >6mm diameter, >2mm wall thickness, periappendiceal inflammation/fat stranding, presence of a fecalith). The accuracy of ultrasounds in diagnosing appendicitis varies between patient populations and institutions. The gold standard for diagnosing appendicitis is pathologic sampling.

The standard of care for treating acute non-perforated appendicitis has been, and currently is, appendectomy. The majority of appendectomies done today are laparoscopic, with open cases being circumstantial. Perforated appendicitis with abscess, unless peritonitis is present or patient is hemodynamically unstable, benefit from drainage, resuscitation, continued antibiotic therapy, and interval appendectomy 6 to 10 weeks afterwards. All patients with suspected or diagnosed appendicitis should receive broad-spectrum antibiotics that cover enteric flora peri-operatively; they have been shown to halt the progression and protect against perforation.

Post-operative complications occur around 3% overall and include superficial skin infections (2 to 4%), intra-abdominal abscess formation (3 to 24%, depending on degree of inflammation and open vs laparoscopic technique), fistula formation, and stump appendicitis.

For a list of educational lectures, grand rounds, workshops, and didactics please visit [BrowardER.com](http://BrowardER.com) and click on the **"Conference"** link.

*All are welcome to attend!*

# Warriors

## Non-operative Management of Acute Appendicitis

More recently, literature in Europe has sought to challenge surgical management of acute appendicitis in favor of non-operative management using various antibiotic regimens. The APPAC study from JAMA in 2015 randomized 500 patients with acute appendicitis to non-operative (3 days of IV ertapenem and 3 days of PO levaquin and metronidazole) or open appendectomy (no longer standard of care). 28% of patients in the experimental group received an appendectomy within the year. In 2015, Svensson et al reported on 50 pediatric patients randomized to non-operative management (IV Merem and Flagyl x 2 days, PO ciprofloxacin and flagyl x 8 days) vs laparoscopic appendectomy. 8/25 of the experimental group received an appendectomy within the year due to recurrence or chronic pain due to fibrosed appendixes. In 2016, Talan et al randomized 30 patients 5 years or older into non-operative (IV ertapenem x 2 days, PO Ancef and Flagyl x 8 days) vs laparoscopic or open appendectomy. 2/16 patients in the experimental arm received an appendectomy within the year. A meta-analysis by Georgiou et al in 2017 found 68/396 pediatric patients treated non-operatively with appendicitis had recurrence, with most of them receiving a subsequent appendectomy.

Overall, non-operative management of acute appendicitis is in its infancy. It appears to be about 82% effective long-term (1 year), with 18% receiving an appendectomy either due to recurrence or chronic abdominal pain. There are no reported complications of the antibiotic regimens, and rates of perforation in patients treated non-operatively are no greater than those treated surgically. Currently, the antibiotic regimens are not standardized, but most patients receive 48 to 72 hours of IV antibiotics, necessitating ER or clinic follow-up; compared to laparoscopic appendectomy which has an average LOS less than 1 day.

## Take Home Points

- ◆ Early Appendicitis does not usually manifest as RLQ pain. Expect peri-umbilical pain associated with nausea and food intolerance.
- ◆ CT scan of the abdomen has >95% sensitivity and specificity for acute appendicitis.
- ◆ Antibiotics-only often treats the initial appendicitis, but recurrence is up to 20%.
- ◆ Act on appendicitis early before it perforates.



## ABOUT THE AUTHOR

This month's case was written by Vikisha Hazariwala. Viki is a 4<sup>th</sup> year medical student from NSUCOM. She did her emergency medicine rotation at BHMC in January 2019. Viki plans on pursuing a career in ophthalmology after graduation.

## REFERENCES

- Cope Z. *Early Diagnosis of the Acute Abdomen*. Oxford: Oxford University Press; 1921.
- Fischer J. *Mastery of Surgery*. 6<sup>th</sup> Edition; 1603-1611. 2007.
- Salminen et al. *Antibiotic Therapy vs Appendectomy for Treatment of Uncomplicated Acute Appendicitis*. JAMA 313(23): 2340-2348. 2015
- Svensson et al. *Nonoperative treatment with antibiotics versus Surgery for Acute Nonperforated Appendicitis in Children*. Annals of Surgery. 261(1):67-71. 2015