Early Acute Appendicitis: Non-Op Management (Reviewed 3/21/20)

Adapted from APSA QSC toolkit available at:

https://drive.google.com/drive/folders/1O-f9S_fSiiY4jKQEzqHqa2Dcx3Po36ra

Selection Criteria

- Ages ≥ 5 years
- Duration of symptoms less than 48 hours
- Clinical diagnosis of acute, uncomplicated appendicitis as defined by the presence of the following:
    - Right lower quadrant abdominal tenderness and
    - **At least one** of the following clinical criteria:

        Fever (or low-grade fever)

        Migratory pain (umbilical-to-right-lower-quadrant)

        Nausea, vomiting – typically following onset of pain

        Rebound-tenderness in McBurney's point (right lower quadrant)

        Rovsing sign (referred right lower quadrant pain on palpating or release in left quadrant)

        Obturator sign (internal rotation of right leg) or psoas sign (active flexion of right thigh)

- Imaging study (ultrasound, computed tomography, or magnetic resonance imaging) confirming acute appendicitis (typical size by imaging below)
    - Ultrasound criteria of acute uncomplicated appendicitis
        - outer diameter of appendix >6 mm during adequate compression and less than 1.1cm (if 1.1cm or greater, more likely to be advanced appendicitis)
    - CT or MRI criteria of acute uncomplicated appendicitis
        - Outer diameter >8 mm
    - No phelgmon, abscess, or appendicolith by imaging

.

Exclusion Criteria

- Inability to take oral medication
- Communication difficulties (eg., severe developmental delay)
- Clinical or imaging suspicion of advanced appendicitis, including (but not limited to):
    - Perforated appendicitis
    - Bowel obstruction
    - Generalized (four quadrant) peritonitis
    - Severe pain
    - Leukocytosis greater than 18,000/mm^3
- Imaging criteria of advanced/complicated appendicitis:
    - Mural discontinuity of the appendix, prominent adjacent phlegmon and/or abscess, walled-off fluid collection in right lower quadrant or pelvis, interloop fluid collection or abscess(es)
- Significant and/or unstable medical co-morbidities or other conditions, including (but not limited to):
    - Unstable diabetes mellitus
    - Unstable cystic fibrosis on supplemental oxygen or requiring steroids
    - Unstable asthma requiring steroids
    - Unstable underlying gastrointestinal conditions (e.g. inflammatory bowel disease) requiring steroid or immunotherapy
    - Neurologic conditions that alter pain perception
    - Congenital or acquired immunodeficiency
    - Known pregnancy at the time of presentation

Non-operative management strategy

1. Admission, IV fluids, NPO for minimum 12 hours and until improving
2. Antibiotic management
    a. Ceftriaxone 50mg/kg (max 2g) q 24h (OR ciprofloxacin 10mg/kg [max 400mg] if allergic) plus Metronidazole 30mg/kg (max 1g or 1.5g if >80kg) q 24 hours (OR Clindamycin: 10 to 13 mg/kg/dose Q8 hours, maximum single dose 900mg)
3. IV pain medication given as needed
4. Serial observation and physical exams
    a. No improvement within first 24 hours or clinical worsening triggers crossover to Surgery
    b. After 12 hour minimum NPO status, may advance diet (starting with clears) if meet all of the criteria below:
        i. Decreased tenderness compared to presentation
        ii. Decreased pain compared to presentation
        iii. Resolution of nausea if present on admission
        iv. Decreased temperature if fevers present on or prior to admission
5. Criteria for discharge:
    a. Completion of a minimum of 24 hours of IV antibiotics
    b. Completion of a minimum of 24 hours inpatient observation
    c. Tolerance of a regular diet and tolerance of first dose of oral antibiotics
    d. Absence of abdominal pain
    e. Completion of patient and caretaker education of signs warranting repeat evaluation (see discharge instructions below)
    f. No repeat CBC is needed, as it will not change management
6. Discharge antibiotics- One week course of:
    a. Ciprofloxacin: 10 to 15 mg/kg/dose (max 750 mg per dose) given twice daily (avoid antacids and calcium-containing products like dairy, vitamins within 2 hours of the dose)
    AND
    b. MetroNIDAZOLE: 10 to 15 mg/kg/dose (max 500 mg per dose) given two or three times daily
7. If unable to tolerate these oral antibiotics may be treated with the alternative regimen of:

    Alternative #1:

    a. Preferred: Amoxicillin/clavulanic acid ES [ratio 14:1] (600mg/42.9mg), 90mg/kg/day divided TID (On formulary at CHCO). TID has increased coverage for more resistant organisms based on pharmacokinetics. Maximum 3 grams per day.

    b. Amoxicillin/clavulanic acid XR [ratio 16:1] (1gm: 62.5mg), 2 to 4 grams per day, divided BID; only comes in 1 gram tablets so only for use in children over 22 kg (not on CHCO formulary, not covered by all insurance).

    OR (Alternative #2)

    c. Trimethoprim/sulfamethoxazole AND metroNIDAZOLE (metroNIDAZOLE dosing as above):
    d. Trimethoprim/sulfamethoxazole: 4 to 16 mg (TMP component)/kg/dose (max 160 mg [TMP component] per dose) given twice daily

Discharge Instructions

Your child was admitted for acute appendicitis. It is very important to know that although you are being sent home, he or she is still recovering and it is very important to continue taking the antibiotics that were prescribed. Missing any doses could cause the infection to return. If this happens, he/she may have to be readmitted and have his/her appendix removed.

It is possible that the antibiotics will cause some side effects, especially an upset stomach and diarrhea. To minimize these side effects, we encourage you to give your child yogurt with active cultures, which can be found at most grocery stores and drug stores. If side effects occur, please do not stop the antibiotics until you speak with your doctor.

It is also possible that over the next several days, as your child returns to normal activities, he or she may experience some pain again. As long as he or she is still eating and drinking and not having fevers, then it is okay to treat him/her with acetaminophen (Tylenol) or ibuprofen (Motrin); this pain will continue to get better and disappear over the next few days.

However, please call the Surgery Clinic *[insert number for Main or Colorado Springs]* if the pain:

- Does not improve with Tylenol or Motrin
- Continues to get worse
- Is severe in nature
- Is associated with a fever (>100.5F) OR
- Your child stops eating or drinking, becomes nauseous or vomits

Post discharge follow-up

- Phone follow-up by clinic nurse at 2-5 days to assess for symptom resolution
    - If develop recurrent abdominal pain, nausea, vomiting and/or fever-- families instructed to return immediately to the hospital.
    - If appendicitis is confirmed, they should be considered **treatment failures** and undergo appendectomy.
- Phone follow-up by clinic nurse at 10-14 days to assure completion of antibiotics and address any questions or concerns

Treatment Failure- Indication for appendectomy

Clinical worsening in <u>one or more</u> of the following:

<u>After IV antibiotic therapy for at least 12h:</u>

- Increasing intensity of abdominal pain
- More diffuse abdominal pain (spreading of pain to at least 1 additional quadrant compared to presentation or becoming generalized)
- Higher temperature (≥1 F) than documented on presentation
- Higher heart rate (≥ 20 beats per minute more than on admission in setting of adequate with pain control)

<u>At any time:</u>

- More diffuse tenderness (spreading of tenderness to at least 1 additional quadrant compared to presentation or becoming generalized)
- Development of signs of progressive sepsis (hypotension, altered mental status)

No improvement in <u>one or more</u> of the following by 24 hours:

- Tenderness (exam similar to presentation)
- Pain (continued pain scores of ≥5 on a scale from 1-10)
- Nausea or emesis
- Advance to oral diet (not tolerating clear liquid diet)
- Temperature > 101 F

Special considerations for patients with suspected SARS-CoV-2

Can patients present with Covid-19 and appendicitis?

Yes, some will have both and we will start seeing them soon. Many with COVID-19 will actually present with GI symptoms (~5-15%) even before respiratory symptoms. If a patient with **early appendicitis** presents with other COVID-19 symptoms or exposures that places them into person under investigation (PUI) category, **we should strongly consider the non-operative, antibiotic pathway** and **await COVID-19 diagnostic testing which will be available for non-elective surgical patients**. If that patient then progresses (fails non-op pathway), we should operate, even if COVID-19 positive, with all COVID-19 perioperative precautions. If, however, that patient is COVID-19 positive and is otherwise responding to antibiotics **but still has fever (common with COVID-19)**, we should not consider them a failure of antibiotics and should recommend that they continue on the non-op pathway.

What about the patient with advanced or perforated appendicitis and concern for COVID-19?

Particularly in places with limited supply of PPE, some may want to delay surgery in the patient who has symptoms or exposures to SARS-CoV-2 (e.g., meets PUI criteria) **AND** has **confirmed or suspected complicated appendicitis.** In this scenario, balancing risks to staff and use of PPE, cooling off with immediate antibiotic treatment and up to a 24h delay in surgery while testing is being done, may be reasonable. If determined to be COVID-19 positive within 24h, offering surgery with all COVID-19 precautions would be an option. If COVID-19 negative, offering surgery with routine precautions could be done.

Reviewed by Sarah Parker, MD, Edward Asturias, MD, and Thomas Inge, MD
3/21/2020

Acknowledgments: The rapid preparation of this guidance document was made possible by the generous contributions of the APSA QSC members, specifically Drs. Peter Minneci, Raquel Gonzalez, and Monica Lopez.