ACUTE APPENDICITIS

(Last updated 8/7/2019; Reviewed by: S*idhant Singh, MD)*

PRESENTING COMPLAINT: Acute abdominal pain, nausea, vomiting, fever

FINDINGS

- **A** Check airway
- **B** ↑/N RR
- **C** ↓/N BP, ↑/N HR, weak/N pulse
- **D** Variable altered (V,P,U,D)*
- **E** Fever, RLQ tenderness; rebound, diffuse rigidity (free perforation) or mass (localized perforation); signs of hypoperfusion if septic shock
- **L_{PC}** ↑ WBC, ↑ Lactate/metabolic acidosis (if sepsis) ↓Platelets (if prolonged)
- **U_{PC}** > 6-mm diameter of the appendix under compression

***V** (verbal), **P (**pain), **U** (unconsciousness), **D** (delirious)

U_{PC} (point of care ultrasound) **L_{PC}** (point of care labs)

OTHER HISTORY

- **History**
  - The clinical history of acute appendicitis patient is notoriously inconsistent due to variations in the position of the appendix, age of the patient, and variable degree of inflammation.
- **Symptoms**
  - Pain, dependent on where the appendix is located, often located in the RLQ; classically, pain initially begins in the periumbilical region and migrates to the RLQ
  - Commonly associated symptoms include: anorexia
  - Less common symptoms: urinary symptoms, tenesmus, diarrhea
- **Signs**
  - Abdominal tenderness in right lower quadrant, guarding, rigidity, right lower quadrant palpable mass, Rebound tenderness, **Iliopsoas sign** (Right hip extension causes pain along posterolateral back and hip), **obturator sign** (Internal rotation of hip causes pain), **Rovsing's sign** (pain over right lower quadrant when left lower quadrant is pressed)

DIFFERENTIAL DIAGNOSES

- Meckel's diverticulitis, acute ileitis, ruptured ovarian cyst, Ectopic pregnancy, Crohn's Disease, ovarian/fallopian tube torsion, tubo-ovarian abscess, testicular torsion, pelvic inflammatory disease, epididymitis, cecal diverticulitis (more common in young Asian adults), urinary tract infection

OTHER INVESTIGATIONS

- **Labs:** CBC (leukocytosis with left shift), electrolyte abnormalities, creatinine (elevated reflecting dehydration)
- **Imaging**
    - CT Abdomen & Pelvis: appendiceal diameter >6mm, not filled with contrast/air due to occlusion of lumen, wall thickening >2mm with wall enhancement, periappendiceal fat stranding, appendicolith; sensitivity 95%, specificity 96%
    - Abdominal US: appendiceal diameter >6mm; sensitivity 85%, specificity 90%

THERAPEUTIC INTERVENTIONS

- **Severity Score**: Severity score helps in determining the management
    - **The Alvarado Score**: Used to identify patients with low likelihood of having appendicitis versus patients who should be further evaluated with imaging.

ALVARADO SCORE

Factors	**Points**
Migratory RLQ pain	1 point
Anorexia or ketones in urine	1 point
Nausea or vomiting	1 point
Tenderness in the RLQ	2 points
Rebound tenderness	1 point
Fever > 37.5˚C	1 point
WBC > 10,000/L	2 points
Neutrophilia > 75%	1 point

    - **Alvarado Score 1-4**: Discharge; predicted number of patients with appendicitis = 30%
    - **Alvarado Score 5-6**: Observe/Admit, Perform further studies; predicted number of patients with appendicitis = 66%
    - **Alvarado Score 7-10**: Operate; predicted number of patients with appendicitis = 93%
- **Medications**
    - NPO, IV Fluids; Ciprofloxacin and flagyl, or other gram-negative aerobe and anaerobe coverage, dosed at indicated intervals pre-operatively, with at least one dose within 60 minutes of initial incision
- **Contact/Consult:** Surgery
- **Procedures**
    - **Non-perforated (Uncomplicated) appendicitis**
        - NPO and IV fluids
        - To operating room for laparoscopic or open appendectomy; often, surgeons treat presumed appendicitis aggressively, accepting approximately a 10-15% rate of negative appendectomies

        - If normal appendix is found, search for other causes for patient's pain (see differential diagnosis list); if no other sources are found, proceed with appendectomy
        - Post-operative antibiotics are unnecessary
        - Discharge within 24-48 hours after patient demonstrates tolerance to PO intake and pain tolerance with PO medications
    - **Perforated (Complicated) Appendicitis**
        - NPO and IV Fluids
        - Ciprofloxacin and flagyl, or other gram-negative aerobe and anaerobe coverage, generally 7-10 days
        - Percutaneous drainage of fluid collection if large enough and accessible; operative resection usually deferred due to adhesions and inflammation that can require extensive dissection and can lead to further injury
        - In cases where patient's sepsis worsens and/or the patient has a disseminated intraabdominal infection, exploratory laparotomy with washout should be considered
        - Discharge patient once pain, fever, leukocytosis, and ability to tolerate PO's is achieved
        - In patients treated with antibiotics, consider interval appendectomy at least 6 weeks after acute episode of appendicitis to prevent recurrence of appendicitis and to exclude neoplasms; the need for interval appendectomy is controversial at this time
    - **Medical treatment**
        - Several trials, albeit with notable limitations, have shown that acute appendicitis may be successfully treated with antibiotics alone; however, guidance on which patients to consider treatment with antibiotics only is yet to be defined

CAUTIONS

- **Complications:** Post-operative: wound infection, hemorrhage, leak from staple line, bowel injury

REFERENCES & ACKNOWLEDGMENTS

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