ACUTE APPENDICITIS

(Presented 8/7/2019; Reviewed by: Sidhant 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)

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**
  o 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%
  o Abdominal US: appendiceal diameter >6mm; sensitivity 85%, specificity 90%

**THERAPEUTIC INTERVENTIONS**

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

**ALVARADO SCORE**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Migratory RLQ pain</td>
<td>1 point</td>
</tr>
<tr>
<td>Anorexia or ketones in urine</td>
<td>1 point</td>
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<tr>
<td>Nausea or vomiting</td>
<td>1 point</td>
</tr>
<tr>
<td>Tenderness in the RLQ</td>
<td>2 points</td>
</tr>
<tr>
<td>Rebound tenderness</td>
<td>1 point</td>
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<tr>
<td>Fever &gt; 37.5˚C</td>
<td>1 point</td>
</tr>
<tr>
<td>WBC &gt; 10,000/L</td>
<td>2 points</td>
</tr>
<tr>
<td>Neutrophilia &gt; 75%</td>
<td>1 point</td>
</tr>
</tbody>
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  o **Alvarado Score 1-4:** Discharge; predicted number of patients with appendicitis = 30%
  o **Alvarado Score 5-6:** Observe/Admit, Perform further studies; predicted number of patients with appendicitis = 66%
  o **Alvarado Score 7-10:** Operate; predicted number of patients with appendicitis = 93%

• **Medications**
  o 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**
  o **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**

Acknowledgements: Sayuri Jinadasa, MD; Stephen Odom, MD
- Brewster GS, Herbert ME. Medical myth: a digital rectal examination should be performed on all individuals with possible appendicitis. Western Journal of Medicine. 2000; 173(3):207.