Acute Abdominal Pain
Surgical Causes

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Appendicitis

- Intestinal appendage from cecum in RLQ
- 1-8% of children; most common indication for emergent abdominal surgery in kids
- <5% of cases in children <5 yo; Most common in 2nd decade of life

Appendicitis: Clinical Presentation

- Anorexia
- Fever
- Abdominal pain
  - Periumbilical then RLQ with progression (non-localized pain, then RLQ from inflamed appendix rubbing against abdominal wall)
- Pain with movement
  - Bumps while in car, jumping, walking
- Vomiting
- Diarrhea (anecdotally smaller volume, “squirting”)

Appendicitis: Physical Exam

- RLQ tenderness
- Peritoneal signs
  - Often sitting very still to avoid moving; can have splinting to minimize movement with breathing
  - Rebound and guarding
  - Bump the bed, ask patient to jump (may refuse)
  - Rovsing sign – RLQ pain with pushing/palpation of the left abd
  - Obturator – pain with flexion and internal rotation of right hip
    - Indicates if appendix is inflamed and in pelvis/rubbing against obturator muscle
  - Iliopsoas/Psoas sign – pain with extend right hip
    - Indicative of inflamed retrocecal appendix

Appendicitis: Diagnosis

- Challenging in young or developmentally delayed children
  - 50% lack migration of pain, 40% no anorexia, 52% no rebound
- Neonates – nonspecific very challenging and rare, but serious
  - Large overlap with sepsis, malrotation with volvulus, intussusception
- Labs
  - CBC, manual differential, CRP, Urinalysis
- Exam findings
  - If high suspicion for appendicitis can involve surgeon and can decide to go straight to OR, rather than waiting for imaging
- Imaging
  - US appendix, CT scan with IV+PO contrast, MRI

Appendicitis: Imaging

- US appendix
  - Criteria: wall thickness >2mm, diameter >6mm
  - Inflamed appendix will be non-compressible
  - Sensitivity 98%, Specificity 92% if the appendix is visualized
  - Not visualized up to ~80% of the time; does not rule out appendicitis
- CT Abdomen with IV and PO contrast
  - Wall thickness >2mm, enlarged appendix, can also see abscess
  - 94-100% sensitive and specific
  - CT scans found not to reduce rate of non-appendicitis appendectomies
- MRI is a consideration but center and resource dependent

Gangrenous and Perforated Appendicitis

- Perforated - Rupture of appendix causing peritonitis
- Correlates with duration of symptoms
- Potential for secondary abscess
- Rates of perforation and age inversely proportional
  - Neonates – 83 percent
  - Young children (<5 years) – 51 to 100 percent
- May require Interventional Radiology for abscess drainage
- Sometimes unable to perform surgery if infection/perforated appendicitis is complex

Intussusception: Definition

- Invagination of a proximal segment of bowel into a distal segment along a lead point
  - Typically ileum into cecum (ileo-colic); can occur at other locations
  - Causes venous and lymphatic obstruction, ischemia, and perforation
  - **Lead point -** hypertrophied Peyer's patches (most common), idiopathic, Meckel's diverticulum, polyps, lymphoma/other malignancy, cystic duplications, wall hematoma, Henoch-Schonlein purpura, cystic fibrosis
  - Usually **6mo-36mo** (<25% after age 2); can occur at **<u>any</u>** age; Male:Female 2:1

Intussusception: Presentation

- Triad
  - **1.** Intermittent abdominal pain (80-95%, crying/irritability in young children)
  - **2.** Sausage-shaped mass in RUQ
  - **3.**"Currant jelly"/bloody stools (late finding)
- Vomiting (>60%) +/- bilious, diarrhea (30%)
- Intermittent, severe pain (self-reducing then recurring, **"drawing up legs to chest"**)

Intussusception

- **Diagnosis**
  - US Abdomen (for intussusception) will see **target-shaped lesion**
  - XR often done incidentally with absence of bowel gas in RLQ
  - Can also see on CT
- **Treatment**
  - **Air or contrast enema reduction**; diagnostic and therapeutic, 1% risk of perforation
  - Surgical reduction if unsuccessful or unstable patient
  - **Recurrence 10%** (after successful non-surgical reduction, ~50% in the first 72 hours)
  - Further work up considered if occurs outside of typical age range or location (not ileo-colic)

Pyloric Stenosis

- Hypertrophy of the pylorus – causing vomiting and dehydration
- **Epidemiology**
  - 2 – 3.5 of 1000 live births
  - Males : Females 4:1, 1.5 fold increase in firstborn children
- **Diagnosis**
  - Age – 3-5 weeks of age, rarely after 12 weeks
- **Presentation**
  - Forceful, projectile, nonbilious, vomiting, hungry afterward
  - Dehydration/decreased wet diapers
  - "Olive mass" – palpated in RUQ with infant prone on examiners hand

Pyloric Stenosis

- **Labs** – hypochloremic hypokalemic metabolic alkalosis (loss of HCl from emesis, low K from compensating for loss of HCl); hyperbilirubinemia can be associated
- **Imaging**
  - Ultrasound
    - Test of choice, pylorus wall thickness >3mm, pylorus channel length >15mm, observe if formula passes through the pylorus
  - Fluoroscopic imaging/UGI can be used or upper endoscopy
- Intervention
  - Fluids and electrolytes - rehydrate
  - Laparoscopic Pyloromyotomy – cut external muscle until reach level of submucosa
- Risk of recurrence afterward is rare

Additional Reading/Reference

- Robert D. Baker. Acute Abdominal Pain. Pediatrics in Review Mar 2018 http://pedsinreview.aappublications.org/content/39/3/130.full