The Acute Abdomen

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Objectives

- Describe embryologic origin of abdominal pain distribution.
- Identify pertinent terminology in describing acute abdominal pain.
- Describe 2 critical findings when evaluating abdominal pain.
- Explain pertinent studies based on predicted etiology of abdominal symptoms.

**References

Overview

- Visceral/splanchnic versus parietal/cerebrospinal/somatic pain
- Since the embryonic gut and its appendages arise as midline organs, their splanchnic innervation is bilateral, and accordingly, visceral pain is perceived in the midline.
  - Foregut = epigastric
  - Midgut = periumbilical
  - Hindgut = lower midline
Overview

- Cerebrospinal nerves/referred pain
  (dermatomes that supply afferent nerves to
  the same segments of the spinal cord as the
  affected organ or irritated nerve)
- Phrenic (C3-C5), supraclavicular (Kehr’s
  sign)
- Genitofemoral, perineum
- Obturator, medial thigh (Howship-Romberg’s
  sign)

History

- Onset (include mode)
- Duration (constant/intermittent)
- Character
- Location
- Radiation
- Factors that exacerbate or alleviate
  symptoms
- Associated symptoms

History

- Past medical and surgical history, including
  risk factors for cardiovascular disease and
  details of previous abdominal surgeries
  - Include over-the-counter medications
- Menstrual (and contraceptive) history in
  women
Physical examination

- Measurement of vital signs
- Examination for jaundice
- Auscultation chest
- Auscultation of the abdomen for bowel sounds
- Palpation of the abdomen for masses, tenderness, and peritoneal signs
- Rectal examination
- Pelvic examination in women with lower abdominal pain

Physical examination

- Abdominal exam
  - Observation (distension, scars, patient position)
  - Auscultation
  - Percussion
  - Palpation
  - Elicitation of peritoneal signs

Physical examination

- Abdominal signs
  - Cullen
  - Grey Turner
  - Kehr
  - Murphy
  - Romberg-Howship
  - Blumberg
  - Markle (heel jar)
  - Rovsing
Physical examination

- Peritoneal signs
  - Guarding (voluntary-involuntary-rigidity)
  - Rebound
  - Heel jar/heel tap
  - Obturator test (pain in medial thigh with rotation)
  - Iliopsoas test (passive extension/active flexion)
  - Rovsing sign
  - Pain out of proportion to exam

Acute abdominal pain etiologies

- Appendicitis
- Acute cholecystitis
- Acute pancreatitis
- Peptic ulcer disease
- Small bowel obstruction
- Diverticulitis
- Extra-abdominal conditions
- Abdominal emergencies
Appendicitis

- Incidence higher in males (1.5 : 1) compared to females
- Incidence highest between ages 10-19, second highest for patient’s in their 20’s
- Diagnostic difficulties in children < age 3, elderly and pregnancy
- Perforation

Appendicitis

- Pathophysiology of perforation in a hollow viscus
- Classic presentation
  - Initial periumbilical pain, localizing to RLQ
  - Anorexia, possible nausea/emesis (follows pain)
  - Fever, leukocytosis (degree may correlate with perforation)
  - McBurney's point tenderness
  - Rovsing's sign

Appendicitis

- Diagnostic tools
  - Modified Alvarado scale
    - Migratory right iliac fossa pain (1 point)
    - Anorexia (1 point)
    - Nausea/vomiting (1 point)
    - Tenderness in the right iliac fossa (2 points)
    - Rebound tenderness in the right iliac fossa (1 point)
    - Fever >37.5 degrees C (1 point)
    - Leukocytosis (2 points)
  - 0-3, Discharge; 4-6, Observation; 7-9, Appendectomy
Appendicitis

- Diagnostic tools
  - Computed tomography
  - Ultrasound
    - Children, elderly, women of childbearing age
    - Diabetes, obesity, and immunocompromised patients
  - Negative appendectomy rate

Appendicitis

- Differential diagnosis
  - Diverticulitis (more common in Asia)
  - Ileitis (Campylobacter, Salmonella, Yersinia)
  - Crohn’s disease
  - Meckel's diverticulitis
  - Ectopic pregnancy & pelvic inflammatory disease

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Acute cholecystitis

- Manifestations
  - Biliary colic
  - Acute cholecystitis
  - Acute cholangitis
  - Gallstone pancreatitis

- Classic presentation of acute cholecystitis
  - RUQ or epigastric pain, acute onset 1-2 hours after ingestion of a fatty meal, constant pain lasting 4-6 hours
  - Radiation of the pain to the mid-back or right scapula
  - Fever, leukocytosis
  - Anorexia, nausea/rarely emesis
  - Positive Murphy’s sign

- Pathophysiology
  - Mucosal irritation/inflammation

- Complications
  - Gangrenous cholecystitis 20%
    - Elderly, diabetic, delayed presentation
  - Perforation 2%
Acute cholecystitis

- Diagnostic tests
  - CBC
  - Liver function tests
    - (elevation can imply more serious diagnosis, e.g. cholangitis, choledocholithiasis, Mirizzi syndrome)
  - Ultrasound
  - Cholescintigraphy (technetium labeled hepatic iminodiacetic acid/HIDA scan)
    - Sensitivity 97% & specificity 90%
    - False positive rate, e.g. liver disease, fasting

Acute cholecystitis

- Differential diagnosis
  - Acute pancreatitis
  - Acute hepatitis
  - Peptic ulcer disease
  - Right-sided pneumonia
  - Fitz-Hugh-Curtis syndrome
  - Subhepatic or intraabdominal abscess
  - Cardiac ischemia
  - Herpes zoster

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Acute Pancreatitis

- 75% caused by gallstones or ETOH
- 5% mortality for acute pancreatitis
- 30% mortality of necrotizing pancreatitis

Classic presentation
- Acute onset of epigastric pain (98%)
- Band distribution
- Radiation to the mid-back
- Nausea/emesis (90%)
- Abdominal distension (ileus)
- Tenderness/guarding disproportionate to pain
- Systemic signs of toxicity (fever, tachycardia, hypotension)

Pathophysiology
- Autodigestive injury of the gland
  - Blockade of secretion with continued pancreatic enzyme synthesis.
  - Intracellular/intraacinar activation of proteolytic enzymes.
  - Autodigestive injury to the gland.
Acute Pancreatitis

• Diagnostic tests
  – Serum amylase
    • elevated within 6-12 hours (half-life 10 hours)
    • not necessary for diagnosis.
    • does not correlate with severity
  – Serum lipase
    • earlier elevation, increased specificity
    • sensitivity 85-100%
  – Liver function tests

Acute Pancreatitis

• Diagnostic tests
  – Radiographs
  – Abdominal ultrasound
  – Computed tomography (CT Severity Index)
    • Grade A Normal Pancreas (0 points)
    • Grade B Diffuse enlargement (1)
    • Grade C Peripancreatic inflammation (2)
    • Grade D Single fluid collection (3)
    • Grade E Two or more fluid collections or air in the pancreas or surrounding retroperitoneum (4)

Acute Pancreatitis

• Diagnostic tests
  – Computed tomography (CT Severity Index)
    • No necrosis (0 points)
    • < 33% necrosis (2)
    • 33-50% necrosis (4)
    • > 50% necrosis (6)
    • 6 points or greater implies severe disease
Acute Pancreatitis

- Diagnostic tests
  - Ranson's criteria (increased mortality > 4)

<table>
<thead>
<tr>
<th>At presentation</th>
<th>At 48 hours</th>
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</thead>
<tbody>
<tr>
<td>Age &gt; 55</td>
<td>Hematocrit decrease by 10%</td>
</tr>
<tr>
<td>WBC &gt; 16,000</td>
<td>BUN increase by 5 mg/dL</td>
</tr>
<tr>
<td>LDH &gt; 350 U/L</td>
<td>Calcium &lt; 8 mg/dL</td>
</tr>
<tr>
<td>AST &gt; 250 U/L</td>
<td>pO2 &lt; 60</td>
</tr>
<tr>
<td>BUN increase by 5 mg/dL</td>
<td>Base deficit &gt; 4 Meq/L</td>
</tr>
<tr>
<td>Positive fluid balance &gt; 6 L</td>
<td></td>
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Peptic Ulcer Disease

- Primary cause of acute abdominal symptoms in this setting is gastric or duodenal ulcer perforation.
- Bleeding gastric or duodenal ulcers can cause abdominal pain, but are usually characterized by hematemesis or melena.
- Mortality for unrecognized perforation is 5% before 12 hours, 20% if delay of diagnosis > 12 hours
Peptic Ulcer Disease

- Perforation rate in the setting of peptic ulcer disease, 2-10%
  - Duodenal 60%
  - Antral 20%
  - Gastric body 20%

Peptic Ulcer Disease

- Classic presentation
  - Acute onset of epigastric pain, quick progression to generalized pain
  - Tachycardia, hypotension, hypothermia
  - Referred pain to the top of both shoulders
  - Rapid development of abdominal rigidity
  - Possible history of heavy NSAID or ETOH use, possible history of prior peptic ulcer disease

Peptic Ulcer Disease

- Diagnostic tools
  - Abdominal radiograph
  - Computed tomography*
  - Ultrasound*
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Small bowel obstruction

- Most frequent causes, post-operative adhesions and hernias

<table>
<thead>
<tr>
<th>Postoperative obstruction related to adhesions</th>
<th>1 year</th>
<th>9%</th>
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<tbody>
<tr>
<td></td>
<td>4 years</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>10 years</td>
<td>30%</td>
</tr>
</tbody>
</table>

- Strangulation risk, 7%-42%

Small bowel obstruction

- Classic presentation
  - Abdominal distention
  - Nausea/emesis (proximal vs. distal obstruction)
  - Inability to pass flatus or stool (early evacuation)
  - Periumbilical, cramping pain with worsening at 5 minute intervals
  - Acute or gradual onset
  - History of previous abdominal surgery
Small bowel obstruction

- Critical points on exam
  - Tympany
  - High-pitched bowel sounds/rushes
  - Search for inguinal, femoral, obturator, umbilical, and incisional hernias
  - Guarding

Small bowel obstruction

- Diagnostic tests

<table>
<thead>
<tr>
<th>Diagnostic Test</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computed tomography</td>
<td>93%</td>
<td>100%</td>
</tr>
<tr>
<td>Ultrasound</td>
<td>83%</td>
<td>100%</td>
</tr>
<tr>
<td>Abdominal radiograph</td>
<td>50%</td>
<td>75%</td>
</tr>
</tbody>
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Lactate (as a marker for strangulation)

<table>
<thead>
<tr>
<th></th>
<th>Sensitivity</th>
<th>Specificity</th>
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<tbody>
<tr>
<td>Lactate</td>
<td>90-100%</td>
<td>82-87%</td>
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Small bowel obstruction

- Differential diagnosis
  - Paralytic ileus
  - Intestinal pseudo-obstruction
  - Gastroenteritis
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Diverticulitis

- Incidence

<table>
<thead>
<tr>
<th>Age</th>
<th>Prevalence of diverticulosis</th>
</tr>
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<tbody>
<tr>
<td>At age 40</td>
<td>5%</td>
</tr>
<tr>
<td>At age 60</td>
<td>30%</td>
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<tr>
<td>At age 80</td>
<td>65%</td>
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- Pathophysiology

Diverticulitis

- Symptoms
  - Asymptomatic 70%
  - Diverticulitis 15-25%
    - Complicated 25% (abscess, obstruction, perforation, fistula)
    - Uncomplicated 75%
  - Lower GI bleeding 5-15%
Diverticulitis

- Classic presentation
  - LLQ pain present for several days (70%)
  - Previous episodes of similar pain (50%)
  - Nausea/emesis (20%)
  - Constipation (50%)
  - Diarrhea (25%)
  - Urinary irritation (10%)

Diverticulitis

- Diagnostic tools
  - Radiographs
  - Computed tomography (sensitivity 97%, specificity 98%)
    - Soft tissue thickening/stranding pericolic fat (98%)
    - Diverticulosis (84%)
    - Thickened bowel (70%)
    - Phlegmon/abscess (35%)

Diverticulitis

- Differential diagnosis
  - Appendicitis
  - Crohn's disease
  - Colon cancer
  - Ischemic colitis
  - Pseudomembranous colitis
  - Ovarian cyst/torsion & ectopic pregnancy.
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Extra-abdominal conditions
- Pneumonia
- Acute myocardial infarction
- Diabetic ketoacidosis
- Herpes zoster
- Acute glaucoma

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Intra-abdominal emergencies

- Mesenteric Ischemia/Infarction
  (rapid onset severe periumbilical abdominal pain, out of proportion to exam, nausea/emesis/sudden bowel)
- Ruptured Aneurysm
  (triatd of pain, pulsatile abdominal mass, hypotension is pathognomonic)
- Diffuse peritonitis
  (generalized abdominal pain, rigidity, systemic toxicity)

Conversations with the surgical consultant

Questions
Objectives

- Describe embryologic origin of abdominal pain distribution.
- Identify pertinent terminology in describing acute abdominal pain.
- Describe 2 critical findings when evaluating abdominal pain.
- Explain pertinent studies based on predicted etiology of abdominal symptoms.

A 42 year old male presents with sharp epigastric pain that woke him up at 0315 this morning. He describes nausea, but no vomiting. He appears anxious but alert and oriented. He does relate a recent increase in use of NSAIDS for back pain.
A 67 year old male presents with gradual increase in left lower quadrant pain over the last 2 days. He has had constipation, but denies diarrhea or hematochezia. On exam, he has a low-grade fever, mild tachycardia and localized left lower quadrant tenderness.

A 35 year old female presents with acute onset of epigastric pain that radiates to the back. She has had nausea and non-bileous emesis. On exam, you note mild tachcardia, scleral icterus and voluntary guarding in the epigastrium.