

The Acute Abdomen: What the NP Needs to Know When Examining Complaints of Abdominal Pain

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Every healthcare provider has a personal responsibility to keep up to date with changes in medicine including new guidelines affecting diagnosis, treatments and management. Thus, please know that changes may occur to the information originally presented in this workshop.

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Objectives

1. Differentiate the characteristics of the various types & causes of abdominal pain
2. Discuss the top common causes of a potential acute surgical abdomen in primary care
3. Develop appropriate history questions to ask individuals with abdominal pain
4. Review evidence-based guidelines for diagnosis, treatment & management of an acute abdomen

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Definitions

- Acute Abdominal Pain
 - Arises suddenly
 - Individuals present to PCP within 48 hours
 - Signs & Symptoms usually occur within 7 days
 - Pain lasting ≥ 6 hrs
 - ? Disorder of surgical significance

De Dombal FT: Diagnosis of Acute Abdominal Pain, 2nd ed. Churchill Livingstone, London, 1991.
Silen, W. Cope' s Early Diagnosis of the Acute Abdomen, 20th ed. Oxford University Press, New York, 2000.

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Definitions

- Chronic Abdominal Pain
 - May appear as acute pain initially
 - Persists or progresses over weeks or months
 - Initially chronic abdominal pain is considered "acute" until work-up reveals otherwise

De Dombal FT: Diagnosis of Acute Abdominal Pain, 2nd ed. Churchill Livingstone, London, 1991.
Silen, W. Cope' s Early Diagnosis of the Acute Abdomen, 20th ed. Oxford University Press, New York, 2000.

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ICD-10 Diagnosis Billable Codes

| Specific Diagnoses | ICD-10 Code |
|----------------------------------|------------------------|
| Abdominal Aortic Aneurysm | I71.XX |
| Appendicitis | K35.XX, K36, K37 |
| Bleeding from Esophageal Varices | I85.XX |
| Cholecystitis | K81.XX |
| Diverticulitis | K57.XX |
| Ectopic Pregnancy | O00.XX |
| Incarcerated Inguinal Hernia | K40.XX |
| Intestinal Obstruction | K56.XX |
| Mesenteric Ischemia | K55.XX |
| Perforated Viscus | K25.xx, K26.XX, K28.XX |

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ICD-10 Diagnosis Billable Codes

| General Diagnoses | ICD-10 Code |
|----------------------------------|-------------|
| Abdomen Pain / Tenderness | R10.XX |
| • Unspecified Tenderness | R10.81 |
| • Left lower quadrant tenderness | R10.814 |
| • Unspecified pain | R10.9 |
| • Upper abdomen pain unspecified | R10.10 |
| Abdominal Rigidity | R19.XX |
| • RUQ rigidity | R19.31 |
| • LUQ rigidity | R19.32 |
| • RLQ rigidity | R19.33 |
| • LLQ rigidity | R19.34 |
| Abdominal Distension (gaseous) | R14.XX |

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Circatrices after shot perforation of the abdomen

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Retrieved 07:26, February 27, 2018.
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Being successful in diagnosing an acute abdomen requires knowing.....

1. How to develop your differential diagnoses
2. Understanding the difference between textbook presentations versus real-time presentations
3. Using evidence-based guidelines
4. Determining the final diagnosis

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The diagnostic problem of today
 Has greatly changed –
 the change has come to stay;
 We all have to confess, though with a sigh,
 On complicated tests we much rely
 And use to little hand and ear and eye.

Sir Zachary Cope (1881-1974)
Abdomen in Rhyme, 1947

Zeta (1947). *The Diagnosis of the Acute Abdomen in Rhyme*. London: H.K. Lewis & Co Ltd.

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How to determine your diagnosis?



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Pain Pathophysiology

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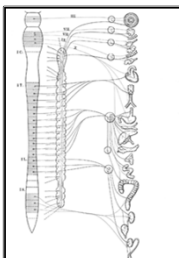
Neuropathic Pain

- Damage to the nerve causes typical pain symptoms

Nociceptive Pain

- Nociceptors in tissues send pain signals to the central nervous system

- **Nociceptors**
 - ✓ "A delta"
 - ✓ "C fibers"



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Pain Pathophysiology

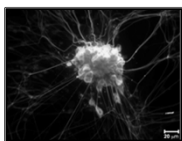
PUBLIC DOMAIN - National Institute of General Medical Sciences Image ID: 13251. Signal
 transduction in nociceptive neurons and pathways. N. Mochly-Rouss, R. M. Mochly-Rouss, and R. Mochly-Rouss
 Chemical Biology

Visceral Pathway

- Afferent "C" fibers innervate walls of hollow organs & capsules of solid organs
 - "C" nerve fibers also found in muscle, peritoneum, mesentery, peritoneum and viscera
- May be associated with autonomic activation
 - Sweating, nausea or vomiting, tachycardia
 - Bradycardia with ↓d BP, skin pallor, & hyperesthesia

Somatic (Parietal) Pathway

- Somatic "A-delta" fibers
- Innervates parietal peritoneum, skeletal muscles, & skin



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Somatic Pain (Parietal = think A-delta)

- **Myelinated nerve: fast, acute pain**
 - Intense, sharp, severe, localized to the site of inflammation, & often muscle rigidity (guarding)

- **Interior stimuli:**
 - Sensitive to inflamed viscus itself and/or chemical stimulus such as infectious pus, blood, gastric acid, or bile
 - May cause involuntary muscle contraction or "involuntary guarding" at area area of inflammation

- **External stimuli:**
 - Sensitive to mechanical stimulus (stretching, pinch, palpation or pinprick), heat, and/or electric shock.

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Visceral Pain (Splanchnic = think C fibers)

- Poorly localized and referred to areas corresponding to the embryonic origin of the affected structure



| Foregut | Midgut | Hindgut |
|---|--|--|
| <ul style="list-style-type: none"> - Esophagus - Spleen - Stomach - Liver - Gall bladder - Pancreas - 1st & 2nd part of Duodenum | <ul style="list-style-type: none"> - 3rd & 4th part of Duodenum - Jejunum - Ileum - Appendix - Ascending colon - Cecum - Proximal 2/3rd of transverse colon | <ul style="list-style-type: none"> - Distal 1/3rd of transverse colon - Descending colon - Sigmoid colon - Rectum - Upper anal canal - Urogenital sinus |

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Visceral Pain (Splanchnic)

- **Unmyelinated nerve: slow, chronic pain**
 - Insidious
 - Difficult to localize

- **Interior stimuli:**
 - Sensitive to distension, ischemia, squeezing, and torsion
 - Usually caused by distension of hollow organs or capsular stretching of solid organs
 - Insensitive to heat, cutting, or electrical shock

- **Associated with motor / autonomic reflexes**
 - Nausea, vomiting, tachycardia, bradycardia, diarrhea, hypotension, muscle rigidity

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Colicky Pain

- Visceral organs associated with peristalsis & obstruction of the hollow viscera
- Pain described *sharp* or *dull*
 - Ureters
 - Bowel

NOTE: Gallbladder & bile duct do not have peristaltic movement/motion – biliary colic is not truly colic!

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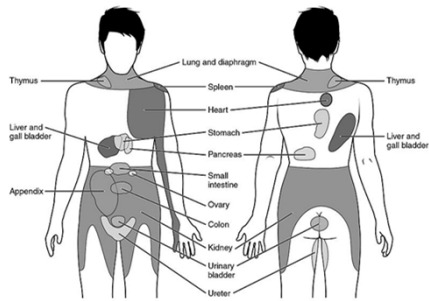
Referred Pain (Think both A-delta & C fibers)

- Pain felt at a site distant from the origin of pain, i.e., diseased organ
- Neurophysiology:
 - Convergence of visceral afferent neurons (C fibers) with somatic (parietal) afferent neurons (A-delta) from different anatomic regions.

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Fig. 1019 Referred Pain, Chapt. 10 (2019, November 29). Wikimedia Commons. The free media repository. Retrieved 27, 2019 from https://commons.wikimedia.org/w/index.php?title=File:1019_Referred_Pain.jpg&rlz=1C29973303.



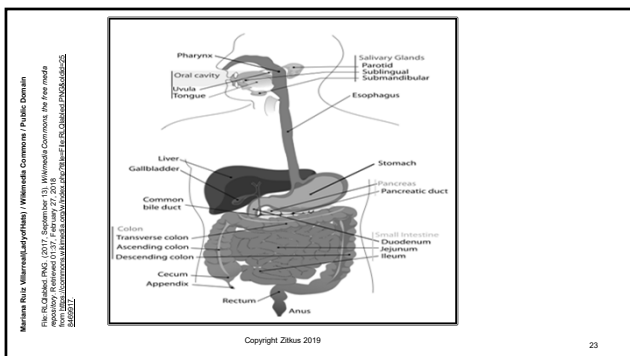
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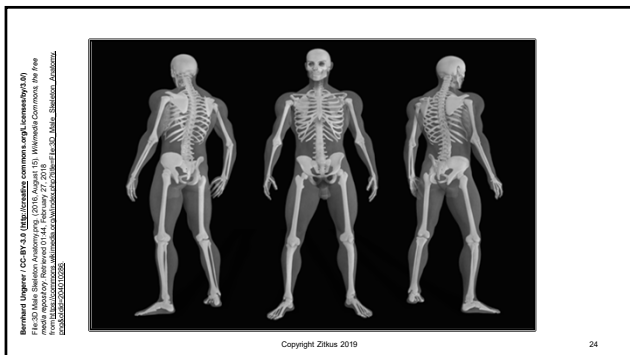
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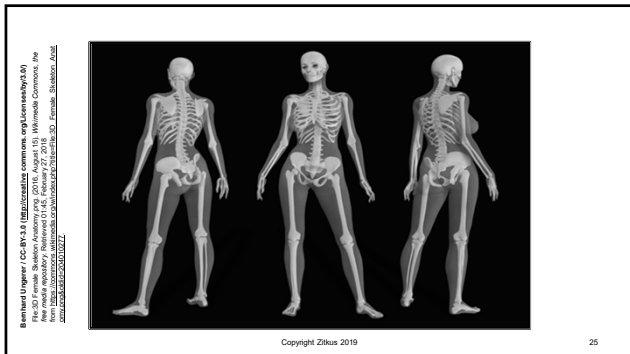
Sensory Innervation of Viscera

| Organ | Embryonic Segment | Site of Pain |
|---------------------------|-------------------|----------------------------------|
| Esophagus | T5-T6 | Retrosternal – Epigastrum |
| Stomach | T6-T10 | Epigastrum |
| Spleen | T6-T10 | Left Hypochondrium |
| Pancreas | T6-T10 | Epigastrum |
| Liver & Gallbladder | T7-T9 | Epigastrum / Right Hypochondrium |
| Suprarenal | T8-L1 | Posterior Lumbar |
| Small Intestine | T9-T10 | Umbilical |
| Kidney | T10-L1 | Posterior Lumbar |
| Gonads | T10-L1 | Lumbar to Groin |
| Large Intestine | T11-L1 | Umbilical |
| Urinary Bladder | T11-L2 | Hypogastrum |
| Uterus | T12-L1 | Hypogastrum |
| Splenic Flexure to Rectum | L1-L2 | Hypogastrum |

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How to determine your diagnosis?

Causes of Abdominal Pain:
Medical vs. Surgical

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Extraperitoneal Causes of Acute Abdominal Pain

| Genitourinary | | Neurogenic | | Toxins | |
|-------------------------|-------------------------|---------------------------|-------------------------------|---|--|
| 1. Pyelonephritis | 8. Orchitis | 1. Herpes zoster | 6. Abdominal epilepsy | 1. Bacterial toxins (tetanus, Staphylococcus) | 5. Drugs |
| 2. Perinephric abscess | 9. Ureteral obstruction | 2. Tabes dorsalis | 7. Abdominal migraine | 2. Insect venom (black widow spider) | 6. Withdrawal from narcotics |
| 3. Renal infarct | 10. Testicular torsion | 3. Nerve root compression | 8. Multiple sclerosis | 3. Animal venom | 7. Heavy metals (lead, arsenic, mercury) |
| 4. Nephrolithiasis | 11. Prostatitis | 4. Spinal cord tumors | 5. Osteomyelitis of the spine | 4. Poisonous mushrooms | |
| 5. Acute cystitis | 12. Dysmenorrhea | | | | |
| 6. Epididymitis | 13. Threatened abortion | | | | |
| 7. Scrotal vesiculitis | | | | | |
| Pulmonary | | Cardiac | | Metabolic | |
| 1. Pneumonia | 4. Empyema | 1. Myocardial infarction | 3. Acute rheumatic fever | 1. Acute intermittent porphyria | 4. Hemochromatosis |
| 2. Pulmonary embolus | 5. Pneumothorax | 2. Myocardial ischemia | 4. Acute pericarditis | 2. Familial Mediterranean fever | 5. Hereditary angioneurotic edema |
| 3. Pulmonary infarction | | | | 3. Hypolipoproteinemia | |
| Vascular | | Psychogenic | | Factitious | |
| 1. Vasculitis | 2. Proctitis | 1. Hypochondriasis | 2. Somatization disorders | 1. Münchausen syndrome | 2. Malingering |

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Extraperitoneal Causes of Acute Abdominal Pain

| Endocrine | | Inflammatory | | | Hematologic | |
|---------------------------------|---|-----------------------------|--|---|----------------------|--|
| 1. Diabetic ketoacidosis | 4. Hypothyroidism | 1. Schönlein-Henoch purpura | 4. Dermatomyositis | 1. Sickle cell crisis | 4. Coagulopathies | |
| 2. Hyperparathyroidism | 5. Hyperthyroidism | 2. SLE | 5. Scleroderma | 2. Acute leukemia | 5. Pernicious anemia | |
| 3. Acute adrenal insufficiency | | 3. Polyarteritis nodosa | | 3. Acute hemolytic states | 6. Other dyscrasias | |
| Infectious | | Musculoskeletal | | Retropertitoneal | | |
| 1. Bacterial | 4. Rickettsial (Rocky Mt spotted fever) | 1. Rectus sheath hematoma | 2. Arthritis / diskitis of thoracolumbar spine | 1. Retropertitoneal hemorrhage (spontaneous adrenal hemorrhage) | 2. Psoas abscess | |
| 2. Parasitic (malaria) | | | | | | |
| 3. Viral (measles, mumps, mono) | | | | | | |
| Trauma | | | | | | |
| 1. Trauma | | 2. Domestic violence | | | | |
| • Blunt | | | | | | |
| • Penetrating | | | | | | |
| • Iatrogenic | | | | | | |

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Intraperitoneal Causes of Acute Abdominal Pain

Inflammatory Processes

| | | |
|--|--|--|
| <p>1. Chemical & nonbacterial peritonitis</p> <ul style="list-style-type: none"> • Perforated peptic ulcer • Perforated biliary tree • Pancreatitis • Ruptured ovarian cyst • Mittelschmerz <p>2. Bacterial peritonitis</p> <ul style="list-style-type: none"> • Primary: Pneumococcal, streptococcal, tuberculosis, spontaneous bacterial peritonitis • Perforated hollow viscus: Esophagus, stomach, duodenum, small intestine, bile duct, gallbladder, colon, urinary bladder <p>3. Mesenteric</p> <ul style="list-style-type: none"> • Lymphadenitis (bacterial, viral) • Ectopic appendicitis | <p>4. Hollow visceral</p> <ul style="list-style-type: none"> • Appendicitis • Cholecystitis • Peptic ulcer • Gastroenteritis • Gastritis • Duodenitis • Inflammatory bowel disease • Meckel diverticulitis • Colitis (bacterial, amebic) • Diverticulitis <p>5. Solid visceral</p> <ul style="list-style-type: none"> • Pancreatitis • Hepatitis • Pancreatic abscess • Hepatic abscess • Splenic abscess | <p>6. Hemorrhagic (rupture)</p> <ul style="list-style-type: none"> • Hepatic neoplasm • Mesentery • Uterus • Graafian follicle • Ectopic pregnancy • Aortic aneurysm • Visceral aneurysm • Spontaneous splenic <p>7. Pelvic</p> <ul style="list-style-type: none"> • Pelvic inflammatory disease (salpingitis) • Tubo-ovarian abscess • Endometritis • Fibroid tumors of the uterus • Adhesions (scars) • Malignant tumors of the uterus or cervix |
|--|--|--|

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Intraperitoneal Causes of Acute Abdominal Pain

| Mechanical: (Obstruction / Acute distention) | | Neoplastic | |
|---|--|---|--|
| <p>1. Hollow visceral</p> <ul style="list-style-type: none"> • Intestinal obstruction ◦ Adhesions ◦ Hernias ◦ Neoplasms ◦ Volvulus ◦ Intussusception ◦ Gallstone ileus ◦ Foreign bodies ◦ bezoars ◦ Parasites <p>2. Biliary obstruction</p> <ul style="list-style-type: none"> • Calculi • Neoplasms • Choledochal cyst • Hemobilia <p>3. Solid visceral</p> <ul style="list-style-type: none"> • Acute splenomegaly • Acute hepatomegaly (congestive heart failure, Budd-Chiari syndrome) | <p>4. Mesenteric</p> <ul style="list-style-type: none"> • Omental torsion <p>5. Pelvic</p> <ul style="list-style-type: none"> • Ovarian cyst • Torsion or degeneration of follicle • Ectopic pregnancy | <p>1. Primary - Metastatic cancer</p> <ul style="list-style-type: none"> • Intraperitoneal neoplasms ◦ Hepatoma (liver) ◦ Cholangiocarcinoma (bile duct or gall bladder) ◦ Pancreatic ◦ Stomach ◦ Lymphoma (immune cells) ◦ Ovarian | |
| | <p style="text-align: center;">Ischemic</p> <p>1. Thrombosis</p> <ul style="list-style-type: none"> • Mesenteric <p>2. Infarction</p> <ul style="list-style-type: none"> • Hepatic (toxemia, purpura) <p>3. Torsion</p> <ul style="list-style-type: none"> • Omental <p>4. Strangulated</p> <ul style="list-style-type: none"> • Hernia | | |

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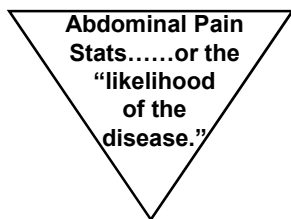
Other reasons why diagnosing a cause is difficult....

1. Abdominal pain may be mild even in an acute abdomen
2. Simple human mistakes, i.e., not asking appropriate questions
3. Patient causes, i.e., does not tell you the whole story or forgets important information
4. Practitioner unfamiliar with the causes of an acute abdomen, i.e., lack of exposure/education
5. Female anatomy structures

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How to determine your diagnosis?



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Acute Abdominal Pain:


Important to know the History!

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Acute Abdominal Pain: AGE

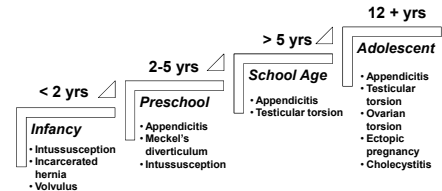
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Acute Abdominal Pain: Infancy - Adolescents

2008 - National Center for Health Statistics



National Center for Health Statistics 35

Acute Abdominal Pain: Age ≤ 50 y/o

| | |
|---|----------------------|
| <input type="text" value="Appendicitis (32%)"/> | <input type="text"/> |
| <input type="text" value="Cholecystitis (6.3%)"/> | <input type="text"/> |
| <input type="text" value="Bowel Obstruction (2.5%)"/> | <input type="text"/> |
| <input type="text" value="Pancreatitis (1.6%)"/> | <input type="text"/> |
| <input type="text" value="Diverticulitis (< 0.1%)"/> | <input type="text"/> |
| <input type="text" value="Hernia (< 0.1%)"/> | <input type="text"/> |
| <input type="text" value="Vascular Disease (< 0.1%)"/> | <input type="text"/> |

2008 - National Center for Health Statistics 36

2009 - National Center for Health Statistics

Acute Abdominal Pain

- Cholecystitis
- Small Bowel
 - NSAID
 - Helicobacter pylori
 - Adhesions (50-70%)
 - Incarcerated hernia (15-30%)
 - Gallstone ileus (20%)
- Large Bowel
 - Colon Cancer
 - Diverticulitis
- Peptic Ulcer
 - Inflammation usually limited to sigmoid colon (50%)
 - Right colon diverticulitis (~2%)
- Appendicitis
- Intestinal
 - Gallstone cause (75%)
 - Mortality 2x
- Diverticulitis
 - Increases with age in parallel with the incidence of coronary artery disease
- Acute Pancreatitis
- Abdominal Aortic Aneurysm
- Acute Mesenteric Ischemia

National Center for Health Statistics
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How to determine your diagnosis?

Subjective Data:
Asking pertinent
Questions.....
this is what it is
all about!

Good questions lead to the diagnosis 90-95% of the time

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ABDOMINAL PAIN LOCATION

9 anatomic locations 4 anatomic locations

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TIMING, CAUSES, & QUALITY OF PAIN

1. When did the pain start? Was the onset sudden or insidious?
2. What caused the pain? Any aggravating or alleviating factors?
3. What does the pain feel like? (Patient's often have difficulty describing the type of pain they are experiencing) Offer suggestions:

- | | |
|------------|----------------------|
| a. Gnawing | e. Pressing |
| b. Burning | f. Feeling hungry |
| c. Boring | g. Cramping |
| d. Aching | h. Sharp, knife-like |

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ABDOMINAL PAIN ONSET

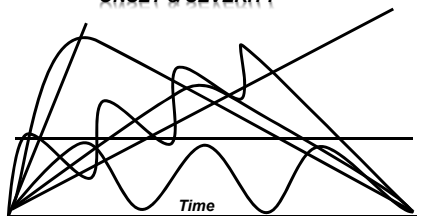
Course over time

1. **Sudden onset** (over seconds to minutes)
 - a. Suggests a ruptured abdominal aneurysm, ruptured ectopic pregnancy, or perforated peptic ulcer.
2. **Rapidly progressive** (over 1-2 hours)
 - a. Suggests pancreatitis, cholecystitis, diverticulitis, bowel obstruction, renal / biliary colic, or mesenteric ischemia.
3. **Gradual** (over several hours progressing more slowly)
 - a. Suggests peptic ulcer disease, distal small bowel obstruction, appendicitis, pyelonephritis, pelvic inflammatory disease, and malignant neoplasm.
4. **Intermittent, crescendo-decrescendo or waxing & waning, constant, abrupt, persistent.**
 - a. Any of the above causes or medical cause

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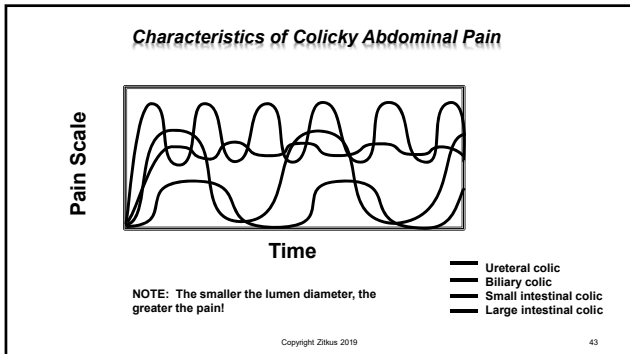
ONSET & SEVERITY



- | | | |
|---------------------------|------------------------------|-------------------------|
| — Sharp-Constant | — Dull-Constant | — Crescendo-Decrescendo |
| — Rapid Onset with Relief | — Rapid Onset without Relief | |
| — Colicky Steady | — Colicky with Relief | |

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- ### ADDITIONAL QUESTIONS
1. Does quality of the pain change over time?
 2. Pain on 0 – 10 scale (severity)
 3. Does the pain radiate to other areas or has the pain moved?
 4. Have you ever had this type of pain before? Any pattern?
 5. Associated symptoms?
 - a. Fever, chills, nausea, vomiting, diarrhea, constipation, distension, jaundice, pruritis, melana, change in stool color, dysuria, oliguria, polyuria, chest pain, SOB, diaphoresis, etc.
 6. Females: Last period, any chance of pregnancy?
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RED FLAG: Nullipara

- Early diagnosis and treatment of an acute abdomen in nullipara women is extremely important. A delay in the diagnosis can lead to perforation of the offending cause with an increased rate of wound infection and intra-abdominal abscess.
- For example, the relative risk of subsequent tubal infertility is increased to about 5 from appendectomy for a ruptured appendix .

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GENERAL INQUIRIES

1. Family history
2. Surgical history
3. Medical history
4. Travel history
5. Drug history
6. Alcohol history
7. Other

- Black Spider Bites
- Lead Poisoning

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Aggravating & Alleviating Factors

| Problem | Aggravating Factor(s) | Alleviating Factor(s) |
|-------------------------------|---|-----------------------|
| AAA | ---- | ---- |
| Appendicitis | Movement & coughing | Lying still |
| Cholecystitis, Cholelithiasis | Fatty foods, drugs, oral contraceptives, cholestyramine | No fat in meals |
| Diverticulitis (Acute) | ---- | ---- |
| Ectopic Pregnancy | ---- | ---- |
| Intestinal Obstruction | ---- | ---- |
| Intestinal Perforation | Movement & coughing | Lying still |
| Mesenteric Ischemia | Eating food | Rest after eating |
| Pancreatitis (Acute) | Lying supine | Leaning forward |
| Perforated Viscus | Movement & coughing | Lying still |
| Peritonitis | Movement | Lying still |

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Associated Signs & Symptoms

| ROS | Symptoms & Signs assoc./w Abdominal Pain | Possible Differentials (Note: Not all differentials listed) |
|--|---|--|
| G A S T R O I N T E S T I N A L | Nausea, vomiting, dyschezia, hematemesis, heartburn, anorexia, diarrhea, constipation, obstipation, hematochezia, melena, clay-colored stool, steatorrhea, polyphagia, tenesmus, ascites, abdominal distention, masses, bruits, ascites | Ulcer, mesenteric ischemia, diabetic ketoacidosis, gastroenteritis, obstruction, esophageal, lymphoma, CHF, hepatomegaly, cirrhosis, cardiomegaly, pancreatic cancer, infective endocarditis, restrictive cardiomyopathy, food poisoning, various hernias, pneumonia, polycystic kidneys, cancer, AAA, porphyria, pelvic floor muscle spasm, adrenal insufficiency, thyrotoxicosis, hypercalcemia, neutropenia, eosinophilic gastroenteritis, polyarteritis nodosa, food allergy, SLE, bezoars, anticholinergics, narcotics, amphetamines, ergotamines, cocaine, acetaminophen, caustics, heavy metals (lead, iron, arsenic, cadmium, & thallium). |

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Associated Signs & Symptoms

| ROS | Symptoms & Signs assoc./w Abdominal Pain | Possible Differentials (Note: Not all differentials listed) |
|-----------------------|--|--|
| G E N | Fever, chills, weight loss, fatigue, night sweats, anorexia, orthostatic problems | Infection, cancer, Familial Mediterranean fever, Abdominal TB |
| S K I N | Rashes, scars, lesions, masses, bites, striae, cyanosis, caput medusa, jaundice, xanthelasma, spider nevi, Kayser-Fleisher rings, purpura, finger clubbing, palmar erythema, asterixis, angioedema | Addisonian crisis, shingles, black widow bite, Rocky Mtn spotted fever, hernia, CHF, liver disease, primary biliary cirrhosis, chronic biliary obstruction, Wilson's disease, hypersplenism, UC, Crohn's, celiac, cystic fibrosis, postoperative incision pain, C1 inhibitor deficiency, Henoch-Schönlein Purpura, |
| H E E N T | Sore throat, Icterus, chronic laryngitis, posterior tooth decay, epistaxis, damage to nasal septum, blue-black line on the gums, ETOH breath, otalgia | Acute GABHS, mesenteric lymphadenitis, liver disease, GERD, medications (NSAIDS, anticoagulants, antiplatelets), cocaine use, lead poisoning, ETOH abuse, *URI, otitis, pharyngitis in peds population* |

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Associated Signs & Symptoms

| ROS | Symptoms & Signs assoc./w Abdominal Pain | Possible Differentials (Note: Not all differentials listed) |
|------------------|--|---|
| C V | Peripheral edema, JVD, chest pain, angina, tearing sensation in chest, hypo- & hypertension | CHF, hepaticomegaly, anemia, inferior wall myocardial ischemia, thoracic aneurysm, dysautonomias |
| R E S P | Dyspnea, shortness of breath, hyperventilation, cough | Pleurisy, lower lobe pneumonia, pneumothorax, acidosis of renal failure, GERD, pulmonary emboli |
| G U | Frequency, urgency, dysuria, polyuria, hematuria, incontinence, hematospermia, testicular or groin pain, penile or vaginal discharge | UTI, STD, pyelonephritis, nephrolithiasis, ureterolithiasis, testicular torsion, prostatitis, hernia |
| G Y N | Vaginal bleeding, vaginal discharge, pelvic congestion followed by uterine contraction, suprapubic or unilateral iliac fossa pain, pain prior to vaginal bleeding, | Dysmenorrhea, ovulation pains (mittelschmerz), ovarian cysts, ectopic pregnancy, pelvic infection, i.e., salpingitis, ovarian torsion |

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Associated Signs & Symptoms

| ROS | Symptoms & Signs assoc./w Abdominal Pain | Possible Differentials (Note: Not all differentials listed) |
|-----------------------|--|--|
| M S | Myalgia, joint pain, trigger points on abdominal wall, rib pain | Strained abdominal muscles, chronic myositis, trauma, myofascial pain syndrome, rectus abdominis nerve entrapment syndrome, ilioinguinal and iliohypogastric nerve entrapments, costochondritis, slipping rib syndrome |
| E N D O | Metabolic acidosis, uremia, weight loss, thyrotoxicosis, angioedema, kidney stone formation, | DKA, alcoholic ketoacidosis, hyperthyroidism, adrenal insufficiency, porphyria, C1 inhibitor deficiency, hypocalcemia / hypercalcaemia, pheochromocytoma |
| N E U R O | Erythema, small papules, vesicles, changes in mental status, convulsions | Herpes zoster, abdominal epilepsy |
| P S Y | Anxiety, depression, any of the physical or painful complaints listed above | Somatoform disorder, psychological disorder |

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How to determine your diagnosis?

Abdominal Pain

Review

Tips

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IMPORTANT REVIEW TIPS

1. Ask about previous surgeries. The info may prevent wasted time when considering differential diagnoses!
2. Midline pain is more likely to be bowel based.
3. Pain before vomiting usually indicates an acute surgical abdomen!
4. Vomiting prior to pain usually indicates a medical cause, i.e., obstruction
5. Ask if a patient has had similar pain in the past. May provide clues to current pain syndrome, i.e., IBD, peptic ulcer, pancreatitis, biliary disease.

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IMPORTANT REVIEW TIPS

6. It is imperative to ascertain if the patient is nulliparous. If yes, one must be very astute in their evaluation as a ruptured appendix or diverticula may cause issues with fertility in the future!
7. If severe vomiting precedes intense epigastric, left chest, or shoulder pain, consider emetic perforation of the intra-abdominal esophagus.
8. Vomiting that precedes pain and is followed by diarrhea is often gastroenteritis. If no diarrhea occurs, then do not call the abdominal pain "gastroenteritis"!
9. If pain precedes the development of ascites, it suggests an inflammatory or neoplastic focus that came first & over time caused edema in the peritoneal cavity.

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Abdominal Examination

Inspection
Auscultation
Percussion
Palpation

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Abdominal Inspection

Abdomen
Periumbilical region
Umbilicus

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Abdominal Auscultation

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Surgical Mantra

The **H & P** is the most important part in the evaluation of patients with abdominal pain!

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Physical Examination

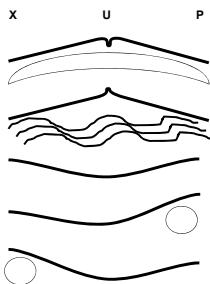
- Methodical Examination

- Inspection
- Auscultation
- Percussion
- Palpation



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- Obesity / Gassy distention
- Ascites
- Slender person (Scaphoid)
- Lower abdominal mass
- Upper abdominal mass

Heuman, D.M., Mills, A.S., & McGuire, H.H. (1997). Gastroenterology. Philadelphia, PA: W.B. Saunders Co.

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Abdomen in General

- **Palpation**
 - Palpate gently – notice for guarding (peritonitis) or rebound tenderness (peritoneal irritation)
- **Pain indicator**
 - Finger pointing = peritoneal irritation
 - Spread palm = visceral pain
- **Atrial fibrillation**
 - ? Mesenteric artery obstruction
- **Tachycardia**
 - Sepsis / volume depletion

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- **Tachypnea**
 - Acidosis / pneumonia / sepsis
- **Pallor / Shock**
 - Acute blood loss
- **Silent abdomen**
 - ? Ileus, mechanical obstruction, sepsis
- **Tympany**
 - ? Mechanical obstruction

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Abdomen Examination

Epicritic Hyperesthesia*

Touching skin lightly with a pin or gently pinching folds of skin in dermatome associated with viscus, i.e., appendix, diverticulum of colon

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Cullen's Sign



Periumbilical bruising = hemoperitoneum

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Pain Evaluation*

- If you believe the patient is not truthful and really does not have abdominal pain, while auscultating press down and compare when you perform your palpation examination.

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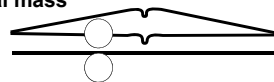
68

Abdominal Mass Evaluation*

- **Remains accessible when patient lifts head = Mass in abdominal wall**



- **Mass moves away when patient lifts head = Intraabdominal mass**



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Mannkopf's Sign

- Increased pulse occurs with palpation of abdomen creating pain = evaluation for true abdominal pain
- Note: Can be used to evaluate pain anywhere

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Carnett's Sign*

- Loss of abdominal wall tenderness when abdominal muscles tensed

Source of pain = Intra-abdominal

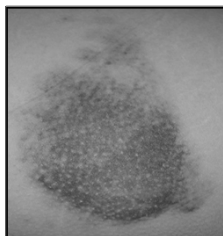
Ortiz, D. D. (2008). Chronic pelvic pain in women. *American Family Physician*, 77(11); 1535-1542, 1544.

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Fothergill's Sign

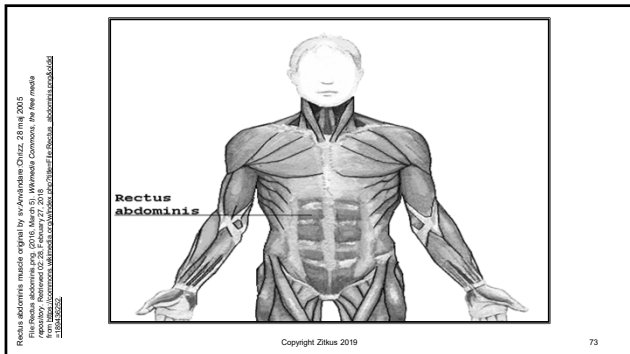
- Abdominal wall mass does not cross midline & remains palpable when rectus muscle is tense = rectus muscle hematoma

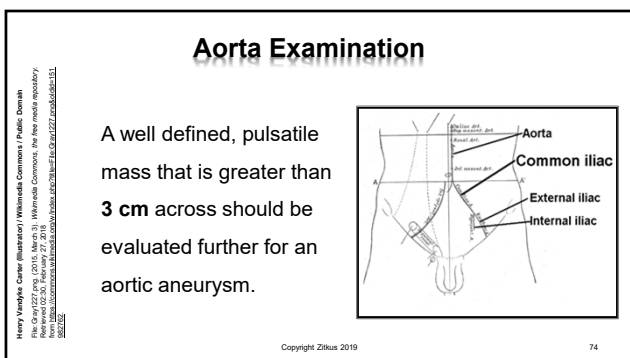


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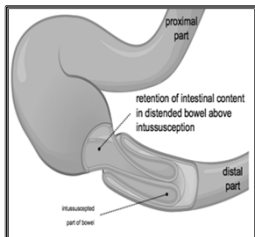




Intestinal Obstruction Examination:

Dance's Sign

Retraction of the right iliac fossa region = Intussusception



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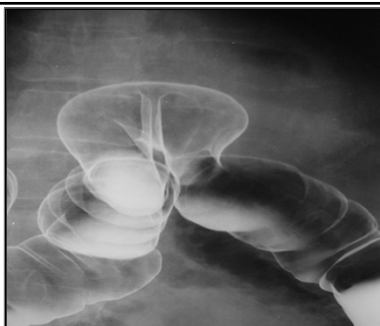
Howship-Romberg Sign*

Pain in medial thigh with extension, abduction, and medial rotation of the hip.

Note: Hernia is not palpable externally and intestinal obstruction is the most common presentation

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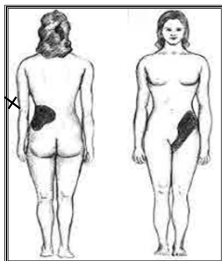
78

Kidney Examination

CVA Tenderness*

Tap over the posterior diaphragm / costal margin

Positive tenderness / pain = kidney stones



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Revised and img. (2018, January 7). Wikimedia Commons, the free media repository. Retrieved 03/05/2019, from https://commons.wikimedia.org/wiki/File:Kidney_locations.png
https://commons.wikimedia.org/wiki/File:Kidney_locations.png

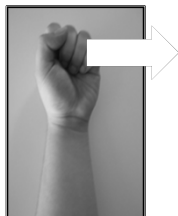
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Peritoneal Irritation Examination

Fist Percussion Sign*

Sternum tapped with fist causes pain in the upper abdomen, i.e., diaphragm, liver, peritoneum, stomach, or spleen involvement



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Markle Sign*

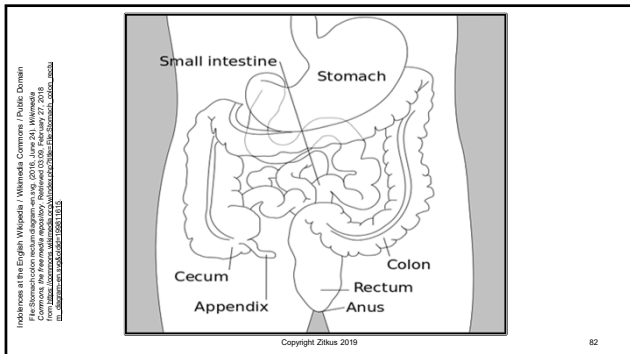
Pain elicited by dorsiflexion of feet or bumping gurney / exam table of patient while lying supine = Peritoneal irritation, appendicitis (pain in RLQ)

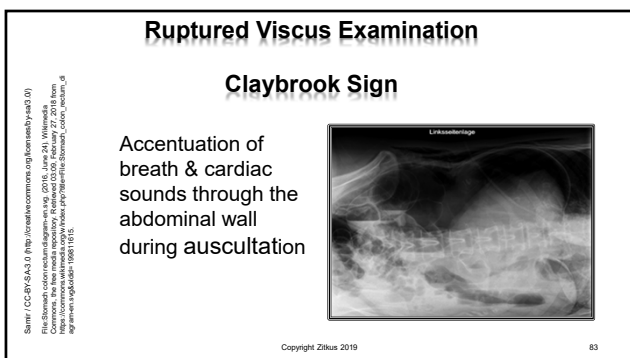


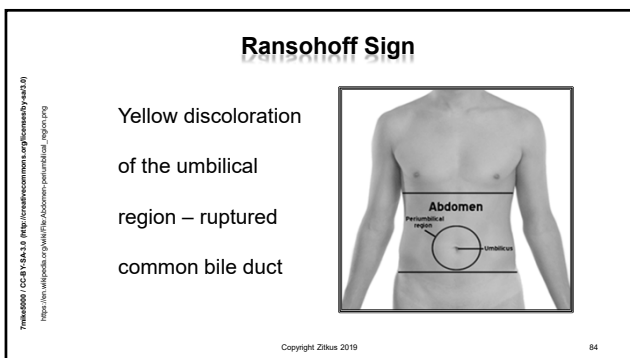
Photograph: Mark 2nd Class Elizabeth A. Edwards / Wikimedia Commons / Public Domain
File:Mark 2.jpg (2015, August 15). Navy air crewman carry a patient on a stretcher. Retrieved 03/05/2019, from https://commons.wikimedia.org/wiki/File:Mark_2.jpg
https://commons.wikimedia.org/wiki/File:Mark_2.jpg

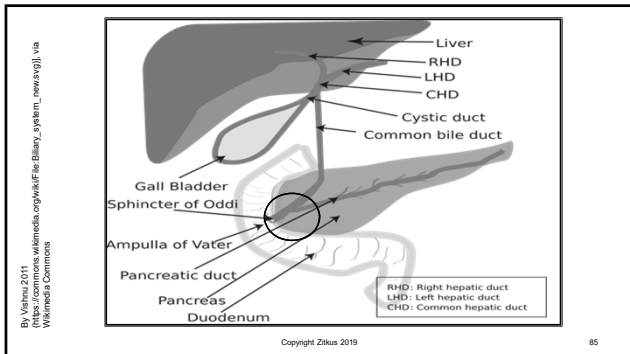
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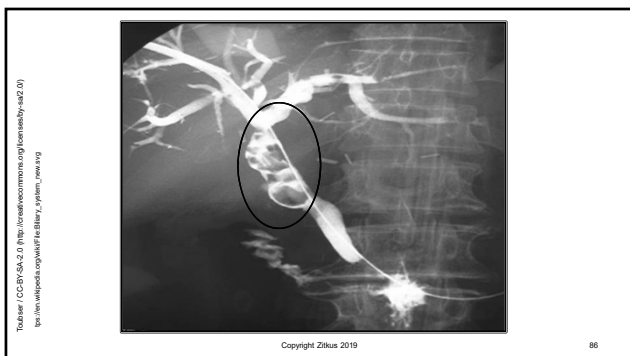
81











RIGHT UPPER QUADRANT: Think...

- **Biliary:** Cholecystitis, Cholelithiasis, Cholangitis
- **Colon:** Colitis, Diverticulitis
- **Hepatic:** Abscess, Hepatitis, Mass
- **Pulmonary:** Pneumonia, Embolus
- **Renal:** Nephrolithiasis, Pyelonephritis

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Liver Examination

Cruveithier Sign

Varicose veins
(caput medusa)
at the umbilicus =
portal hypertension



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https://www.wikidoc.org/wiki/File:Caput_medusae.jpg

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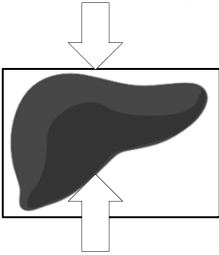
Chen M / CC BY 2.0 (<http://creativecommons.org/licenses/by/2.0/>)
File:Assessment of caput medusae-Schistosoma japonicum infection in China 2016-
Reviewed 03/28/2018. In: https://www.wikidoc.org/wiki/File:Assessment_of_caput_medusae-Schistosoma_japonicum_infection_in_China_2016-Reviewed_03_28_2018.jpg



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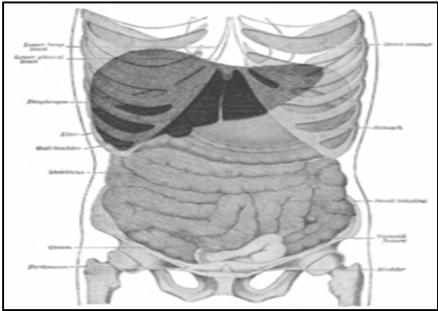
Liver: Percussion



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Scratch Test

If you are attempting to evaluate the liver size and are having problems hearing the difference between dullness and tympany, use your stethoscope to evaluate size while lightly scratching the area.



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File:Beath sounds by hearing auscultation of lungs with stethoscope.jpg (2017, February 17, 2018). Wikimedia Commons, the free media repository. Retrieved 03, 2019. https://commons.wikimedia.org/wiki/File:Beath_sounds_by_hearing_auscultation_of_lungs_with_stethoscope.jpg#/media/File:Beath_sounds_by_hearing_auscultation_of_lungs_with_stethoscope.jpg

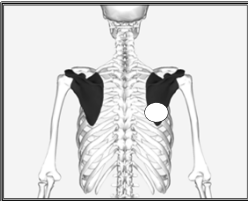
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Gallbladder Examination

Boas' Sign

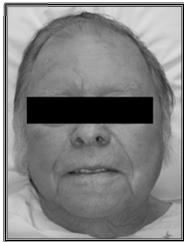
Hyperesthesia
below the right
scapula



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Charcot's Sign

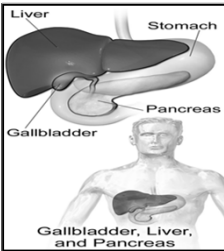
Intermittent right upper
abdominal pain, jaundice,
pruritus & fever



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Murphy's Sign*

Pain caused during
inspiration
while applying
pressure to RUQ



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LEFT UPPER QUADRANT: THINK...

- **Cardiac** – Angina, MI, Pericarditis
- **Gastric** – Esophagitis, Gastritis, Peptic Ulcer
- **Pancreatic** – Mass, Pancreatitis
- **Renal** – Nephrolithiasis, Pyelonephritis
- **Vascular** – Aortic Dissection, Mesenteric Ischemia

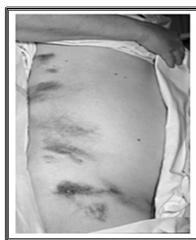
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Pancreas Examination:

Grey-Turner's Sign

Discoloration around the umbilicus & flanks = Acute hemorrhagic pancreatitis or retroperitoneal bleed



Hemorrhagic pancreatitis - Grey Turner's sign by Herbert L. Ford, MD and Herbert A. van DIN, MD, CC-0 (2) 8 (http://creativecommons.org/licenses/by/2.0)
 First hemorrhagic pancreatitis - Grey Turner's sign (pd, 2013, October 26). Wikimedia Commons. In the media repository. Retrieved 11:34, February 28, 2018.
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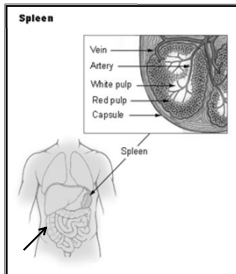
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Spleen Examination: Palpation*

- Start at RLQ
 - ✓ Prevent missing enlarged spleen
- Set your fingers & have pt take a deep breath. After each expiration by patient move diagonally upward towards LUQ
- Focus: Location of spleen below costal margin, texture of spleen contour, & tenderness

Note: Overly aggressive palpation may cause injury



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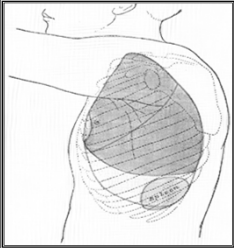
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Spleen Examination: Percussion*

Traube's (semilunar) space where spleen is located. It's surface markings are respectively the left sixth rib, the left anterior axillary line, and the left costal margin.

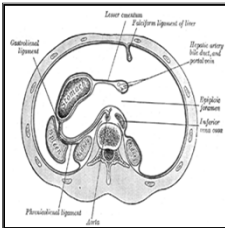


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Percussion at the lowest costal interspace in left anterior axillary line – tympany should be heard

Have the patient take a deep breath and percuss again – dullness may be splenic enlargement



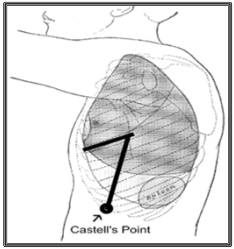
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Castell's Sign*

The patient is supine. You percuss in the lowest intercostal space in the left-anterior axillary line in full expiration and inspiration. Splenomegaly is suggested when the percussion is dull or becomes dull on inspiration.

SENSITIVITY 60-85% SPECIFICITY 72-82%



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Balance's Sign

Splenic rupture = Dullness to percussion in LUQ flank with shifting dullness to percussion in the right flank

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Kehr's Sign

Left shoulder pain when supine & pressure applied to LUQ = Hemoperitoneum from a splenic origin

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RIGHT LOWER QUADRANT: THINK...

- **Colon:** Appendicitis, Colitis, Diverticulitis, IBD, IBS
- **Gynecologic:** Ectopic pregnancy, fibroids, ovarian mass, torsion, PID
- **Renal:** Nephrolithiasis, Pyelonephritis

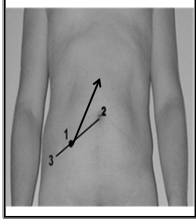
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 #MedEdStudy/epid/ios (2015, February 27). Wikimedia Commons. Retrieved 13/7/ February, 2019 from https://commons.wikimedia.org/wiki/File:McBurney's_point.jpg
 https://doi.org/10.1371/journal.pone.0120288

Appendix Examination

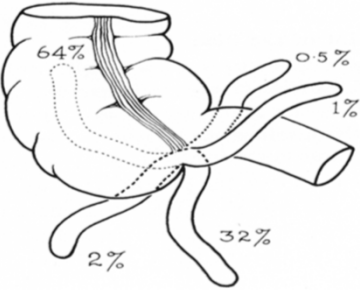
Aaron's Sign

Continuous pressure at
 McBurney's point causing
 referred pain in the
 epigastrium



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 Retrieved 19/02/ February (2019). Wikimedia Commons. Retrieved 19/02/ February, 2019 from <https://commons.wikimedia.org/wiki/File:Appendix.jpg>
 https://doi.org/10.1371/journal.pone.0120288



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Allodynia

Area of hypersensitivity often found prior to perforation
 of appendix

Bassler Sign

Pinching & pulling at the area of the appendix between
 the thumb & iliacus muscle causes sharp pain – chronic
 appendicitis

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Blumberg's Sign*

Rebound tenderness
indicating peritoneal
inflammation

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Britton's Sign

Cremasteric reflex in men when
pressure applied to right lower
quadrant

A = Area of sensory fibers controlled by the
genitofemoral nerve

B = Area controlled by the ilioinguinal nerve

C = Direction and location where the skin
must be stroked to elicit this reflex

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Psoas Sign*

Extension of right leg
at the hip in left lateral
decubitus position
causing pain

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Obdurator Sign*

Flexion & external rotation of the thigh while supine creates hypogastric pain

Both signs-common.wikimedia.org/commons:File:Obdurator Sign Muscles 1.PNG (2017, November 03). Wikimedia Commons. The Free Media Repository. Retrieved 16:09, February 26, 2019. https://commons.wikimedia.org/wiki/File:Obdurator_Sign_Muscles_1.PNG#/media/File:Obdurator_Sign_Muscles_1.PNG

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Rosenstein's Sign

Increased tenderness in RLQ when moving from supine to recumbent posture on the left side

Rovsing's Sign

Compression of the left lower abdomen creates pain at McBurney's point

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Ten Horn Sign

Pain caused in the right testicle with gentle traction of the testicle

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LEFT LOWER QUADRANT: THINK...

- **Colon:** Colitis, Diverticulitis, IBD, IBS
- **Gynecologic:** Ectopic Pregnancy, Fibroids, Ovarian Mass, Torsion, PID
- **Renal:** Nephrolithiasis, Pyelonephritis

<http://medinfo.ufl.edu/year1/bcs/clst/abdomen.html#AA5>
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Intestine Examination: Diverticulitis

Consider Psoas or Obturator Signs

If inflamed diverticulum is located near the psoas or obturator muscles, discomfort can occur from movement of these muscles on the left side

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SUPRAPUBIC EXAMINATION: THINK...

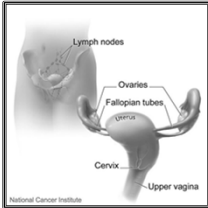
- **Colon:** Appendicitis, Colitis, Diverticulitis, IBD, IBS
- **Gynecologic:** Ectopic Pregnancy, Fibroids, Ovarian Mass, Torsion, PID
- **Renal:** Cystitis, Nephrolithiasis, pyelonephritis

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Pelvic Examination
Chandelier Sign

Movement of cervix causes extreme lower abdominal / pelvic pain = Pelvic Inflammatory Disease



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Don Blase (Blason) - The Cervix and nearby organs [2015, June 15]. Wikimedia Commons. Available from: https://commons.wikimedia.org/wiki/File:Blason_-_The_Cervix_and_nearby_organ_001.jpg

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Danforth Sign

Shoulder pain with inspiration = Hemoperitoneum

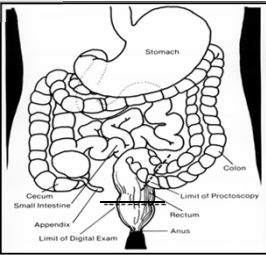
Note: Seen in ectopic pregnancy

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Rectal Exam

– Very important exam for both men & women

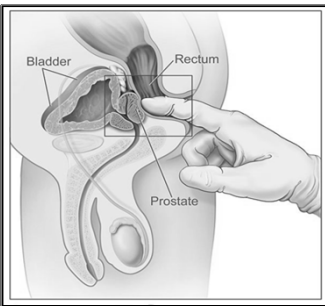
- Pain elicited during this exam may reveal:
 - Pelvic appendicitis
 - Diverticulitis
 - Tubo-ovarian pathology



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Bladder Rectum Prostate

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 File:Exam of the obese patient ncbi.nlm.nih.gov/pubmed/21962000 (2017, April 7). Wikimedia Commons, the free media repository. Retrieved 18:22, February 26, 2019. https://commons.wikimedia.org/wiki/File:Exam_of_the_obese_patient_ncbi.nlm.nih.gov/21962000

Exam of the Obese Patient

- Palpation of abdomen in an obese patient
 - Imagine shape & size of organs
 - Mark costal margins, iliac spines & pubis
 - Allows one to know where the true anterior abdominal wall is



Heuman, D.M., Mills, A.S., & McGuire, H.H. (1997). Gastroenterology: Phila, PA: W.B. Saunders Co.

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Special Techniques*

- Resistant patient
- Disingenuous patient
- Anxious patient
- Ticklish patient

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Resistance to palpation*

Voluntary vs involuntary rigidity of muscle

- Voluntary rigidity of muscles

1. Flex hips & hold conversation with patient
2. Press on lower sternum while palpating with right hand – inspiration against pressure, thus patient must relax abdominal muscles

- Involuntary rigidity of muscles

1. Relaxing maneuvers above fail
2. Examine each quadrant if asymmetry observed

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Disingenuous or Over-reactive patient*

1. Ask the patient questions and have him or her answer during palpation.
1. It's difficult to talk and voluntarily guard at the same time.
2. If the pain is real, the patient will stop talking during guarding.

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Disingenuous or Over-reactive patient*

1. If you become suspicious during your initial discussion with the patient and whether his or her pain is real, you can press your stethoscope down deeper during the auscultation of the abdomen.
2. If the patient does not react during auscultation, but reacts during palpation, it provides you a clue to whether the pain is real.

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Ticklish patient*

1. Place the patient's hand under your hand and press down on their abdomen

- One usually cannot tickle oneself.

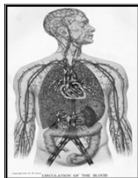
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How to determine your diagnosis?

Differential Diagnoses....

AAA, Appendicitis, Cholecystitis,
Diverticulitis,
Ischemia, Obstruction,
Pancreatitis,
Perforation, &
Ectopic
Pregnancy



H. M. Dixon / Wikimedia Commons / Public Domain
File:Cholecystitis.jpg (800 x 600) [2017 December 24] - Wikimedia Commons.
The Anatomical History Reference is 2017 February 25, 2018
and <https://commons.wikimedia.org/wiki/File:Cholecystitis.jpg>

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Case Study 1

- 42-year-old female
- Homemaker
- Presents with epigastric pain
- Started this morning after drinking two cups of coffee
- Feels nauseous
- Medical Hx
 - Obese
 - HTN
 - Pre-diabetes (A1c 6.1)
- Surgical Hx
 - C-section x 3

Are there any additional subjective questions you would like to ask?

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- VS: BP: 130/94 P: 96 RR: 18 T: 100.3
- Chest: BS CTA B/L
- Abd: Soft, obese with hypoactive BS's; tenderness on palpation of epigastric region

Are there any additional areas you would like to examine or perform specific tests to?

- In-house labs:
 - CBC - WBC 13,000 **21x10⁹/l** with left shift
 - LFT's - mild elevation of ALT & AST

What is your diagnosis?

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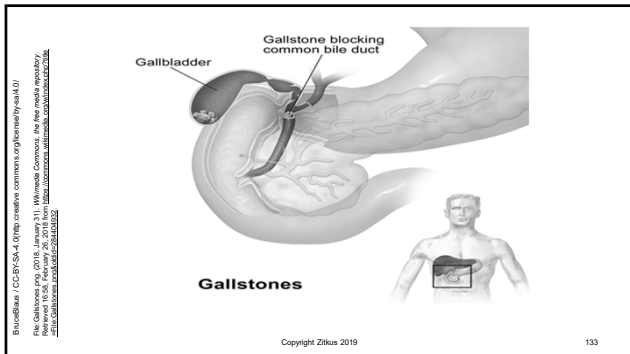
Acute Cholecystitis

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Abdominal Exam Clues: Cholecystitis

- Sudden acute RUQ &/or epigastric pain which may radiate to shoulder or back
- Recurrent pain attacks following meals (1-6 hrs)
- Biliary colic: Crescendo pain
- Nausea / Vomiting
- Elevated temp - fever
- Murphy's Sign
- Jaundice

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Evidence-Based Recommendations

1. Obtain patient history for features suggestive of acute cholecystitis. **[AB]**
2. Recognize the clinical setting of acute acalculous cholecystitis. **[B]**
3. Use laboratory data to establish the diagnosis. **[B]**

2013 .ACP PIER & AHFS DII® Essentials™, Philadelphia, PA. American College of Physicians. STAT!Ref Online Electronic Medical Library. <http://online.statref.com/document.aspx?xid=92&docid=61>.

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| Laboratory and other studies for Acute Cholecystitis | |
|--|--|
| Test | Notes |
| Complete blood count | Look for leukocytosis |
| Liver function tests | Can be elevated in acute cholecystitis |
| Serum bilirubin | If > 4 mg/dL, consider common bile-duct stones or Mirizzi syndrome |
| Serum amylase | If significant increases (more than three times the upper limit of normal), consider pancreatitis or common bile-duct stones |
| Serum alkaline Phosphatase | Elevation significantly predicts acute cholecystitis |
| Right upper quadrant US scan | Sensitivity 81-98% Specificity 70-98% Portable, inexpensive Sonographic Murphy's sign (showing maximal tenderness directly over the visualized gallbladder) is over 90% predictive of acute cholecystitis |
| HIDA scan | Sensitivity 85-97% Specificity 90% |
| CT scan | Expensive, most useful to diagnose such complications as perforation |
| MRI scan or MRCP scan | Sensitivity 100% for cystic-duct obstruction; 69% for gallbladder-wall thickening Specificity 93% for cystic-duct obstruction; 83% for gallbladder-wall thickening Commonly used to diagnose ductal obstruction caused by stones or a malignant lesion |
| <small>CT = computed tomography; HIDA = hepato-imino-diagnostic acid; MRCP = Magnetic resonance cholangiopancreatography; MRI = magnetic resonance imaging</small> | |

Case Study 2

- 45-year-old male
- Accountant
- Presents with lower abdominal pain x 2 days
- Pain achy and gradual
- Tired with ? Fever
- Diarrhea 2 days ago without blood
- Denies N/V or urinary symptoms
- No medical or surgical hx

Are there any additional subjective questions you would like to ask?

VS: BP 128/78 P 88 RR 18 T 100.0°

Abdomen: Mild left lower abdomen tenderness to palpation

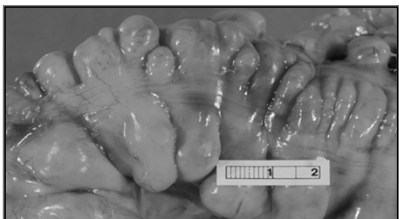
Rectal: No hemorrhoids, fissures, vault without masses; hemoccult negative

Are there any additional areas you would like to examine or perform specific tests to?

- In-house labs:
 - CBC - WBC 12,800/mm³ with 74% polymorphonuclear leukocytes, 22% lymphocytes, and normal H&H
- In-house x-ray:
 - KUB = no pneumoperitoneum / non-specific bowel gas pattern

What is your diagnosis?

Diverticulitis



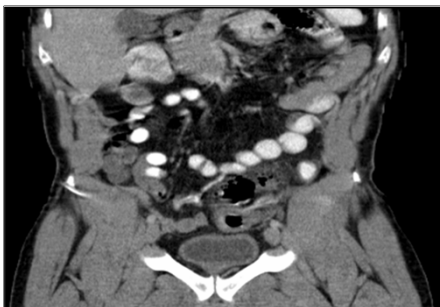
Large bowel (sigmoid colon) showing multiple diverticula. Note how the diverticula appear on either side of the longitudinal muscle bundle (taenium).

Hayman J | Wikimedia Commons / Public Domain
File:Diverticula of sigmoid colon.jpg (2014, October 27). Wikimedia Commons. In: Free media repository. Retrieved 17:18, February 26, 2018 from https://commons.wikimedia.org/wiki/File:Diverticula_of_sigmoid_colon.jpg#/media/File:Diverticula_of_sigmoid_colon.jpg

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SIGMOID DIVERTICULA ON CT SCAN



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File:01-Sigmoid diverticula CT scan 001 Perforation.png (2014, January 14). Wikimedia Commons. In: Free media repository. Retrieved 17:18, February 26, 2018 from https://commons.wikimedia.org/wiki/File:01-Sigmoid_diverticula_CT_scan_001_Perforation.png#/media/File:01-Sigmoid_diverticula_CT_scan_001_Perforation.png

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PNEUMOPERITONEUM



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Abdominal Exam Clues: Diverticulitis

- LLQ or RLQ pain
- Fever & chills
- Constipation / diarrhea
- Anorexia, N/V
- ↓'d bowel sounds
- Palpable LLQ mass
- LLQ rebound tenderness
- Psoas or Obturator Sign
- Rectal exam pain

- Uncomplicated diverticulitis (75%)
 - Abdominal pain
 - Fever
 - Leukocytosis
 - Anorexia
 - Constipation / obstipation
- Complicated diverticulitis (25%)
 - Abscess (15%)
 - Perforation (10%)
 - Stricture (5%)
 - Fistula (1%)

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Acute Diverticulitis Clinical Alerts

- Common symptoms include fever, tachycardia, anorexia, nausea and vomiting, dysuria, and urinary frequency.

NOTE: Asian patients have predominantly right-sided diverticula and often present with right lower abdominal pain.

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Evidence-Based Recommendations

1. The initial evaluation of a new patient with suspected acute diverticulitis should include a problem-specific history & physical examination; a complete blood count (CBC), urinalysis, and plain abdominal radiographs may be useful in selected clinical scenarios [D].
2. Computerized tomography (CT) scan of the abdomen and pelvis is usually the most appropriate imaging modality in the assessment of suspected diverticulitis [A].

Rafferty, J., Shellito, P., Hyman, N.H., Buie, W.D., & th Standards Committee of The American Society of Colon and Rectal Surgeons (2006). Practice parameters for sigmoid diverticulitis. *Diseases of the Colon and Rectum*, 49(7):933-944.

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Evidence-Based Recommendations

3. Contrast enema x-ray, cystography, ultrasound, and endoscopy are sometimes useful in the initial evaluation of a patient with suspected acute diverticulitis [B].
4. Nonoperative treatment typically includes dietary modification and oral or intravenous antibiotics [B].
5. After resolution of an initial episode of acute diverticulitis, the colon should be adequately evaluated to confirm the diagnosis [D].

Rafferty, J., Shellito, P., Hyman, N.H., Buie, W.D., & the Standards Committee of The American Society of Colon and Rectal Surgeons (2006). Practice parameters for sigmoid diverticulitis. *Diseases of the Colon and Rectum*, 49(7), 939-944.

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Laboratory and other studies for Acute Diverticulitis

| Test | Notes |
|-----------------------------|--|
| Complete blood count | ✓ Look for leukocytosis (~ 12-15,000/mm ³) with immature polymorphs. Note: WBC not elevated in 45% of cases ✓ Hemoglobin normal unless there is bleeding |
| ESR | Elevated |
| UA | WBC's & RBC's if there is a fistula present; rule out urinary tract infection or kidney stones |
| Abdomen X-ray | May be helpful in excluding diagnosis of bowel obstruction |
| CT Scan (Abd / Pelvis) | Most appropriate imaging modality for assessment of suspected diverticulitis and possible perforation. With use of IV / luminal contrast sensitivity & specificity can attain 99% / 99% |
| Ultrasound (Transabdominal) | High diagnostic accuracy of 87%. May use in those with relative contraindications to CT scan, e.g., pregnancy, renal insufficiency, and contrast allergy |
| MRI (Abd / Pelvis) | Sensitivity and specificity of 94% / 92%. May use in those with relative contraindications to CT scan, e.g., pregnancy, renal insufficiency, and contrast allergy |
| Colonoscopy | NOT to be done during acute episode; however, 6-8 weeks after resolution of episode may be performed in those if this is a first episode or recent colonoscopy has not been done to confirm diagnosis since CT scan revealing simple thickening on imaging could have ischemia, IBD, or neoplasia |

National Guideline Clearinghouse: Feingold, D., Steele, S.R., Lee, S., Kaiser, A., Boushey, R., Buie, W.D., & Rafferty, J.F. (2014). Practice parameters for the treatment of sigmoid diverticulitis. *Dis Colon Rectum*, 57(3), 284-294. [102 references]

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Case Study 3

- 35-year-old male
- Construction
- Presents with severe epigastric pain x 2 hrs
- Post-prandial abdominal pain, nausea, emesis x 24 hrs
- Pain relieved with bending over
- No medical or surgical hx

Are there any additional subjective questions you would like to ask?

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VS: BP 158/98 P 102 RR 18 T 98.0°

Abdomen: Extreme tenderness with rebound and guarding at epigastric region

Rectal: No hemorrhoids, fissures, vault without masses; hemoccult negative

Are there any additional areas you would like to examine or perform specific tests to?

- In-house labs:
 - CBC - Macrocytic anemia
 - Electrolytes: Metabolic acidosis
 - Lipase 5766 U/hr, total bilirubin 1.2 mg/dL, LDH 410 U/L

What is your diagnosis?

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Acute Pancreatitis

Etiology Mnemonic:

"I get smashed"

- I** = idiopathic
- G** = gallstones
- E** = ethanol
- T** = trauma
- S** = steroids
- M** = mumps
- A** = autoimmune
- S** = scorpion sting
- H** = hyperlipidemia / hypercalcemia
- E** = ERCP
- D** = drugs (diuretics & azathioprine)

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File:Pancreas and nearby organs.jpg (2013, February 10) Wikimedia Commons, the free encyclopedia. https://commons.wikimedia.org/wiki/File:Pancreas_and_nearby_organs.jpg
#14845412/20092526

National Cancer Institute

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Abdominal Exam Clues: Pancreatitis

- Sudden epigastric pain often with radiation to flanks & back
- Constant & boring pain
- Nausea / vomiting
- Distended abdomen
- S&S after heavy meal or excessive ETOH
- Steatorrhea

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Acute Pancreatitis Diagnosis

The diagnosis of acute pancreatitis is established with the presence of **2** of the following **3** criteria:

1. Abdominal pain consistent with the disease
 2. Serum amylase and/or lipase greater than 3 times the upper limit of normal
 3. Characteristic findings from abdominal imaging
- Consider genetic testing in those < 30 years of age

National Guideline Clearinghouse: Tenner, S., Baillie, J., Dewitt, J., & Vege, S.S. (2013). American College of Gastroenterology guideline: Management of acute pancreatitis. *Am J Gastroenterology*, 108(9): 1400-1415. [157 references]

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Acute Pancreatitis Clinical Alerts

The most common causes of pancreatitis are gallstones and excessive alcohol use

- Incidence of gallstone pancreatitis is ↑'d among white women > 60 yrs old and highest in those with small gallstones (< 5mm size)
- Excessive alcohol use causing pancreatitis: men > women; is dose dependent
- Other causes: hypertriglyceridemia, duct obstruction, medications, and trauma

2014 Merck Manual: http://www.merckmanuals.com/professional/gastrointestinal_disorders/acute_abdomen_and_surgical_gastroenterology/acute_pancreatitis.html

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Evidence-Based Recommendations

1. Obtain detailed history to establish the diagnosis and possible cause of AP [C].
2. Use detailed physical exam to help establish the diagnosis of AP and to determine its etiology and severity [C].
3. Obtain serum markers of pancreatic injury [B].

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5. Obtain imaging studies to assist in the diagnosis of AP, to look for an underlying etiology, to judge severity, and to exclude other disease processes [B/C].
6. Obtain comprehensive laboratory evaluation in all patients with AP [B/C].
7. Determine the severity of AP [B/C].

2013. ACP PIER & AHFS DI® Essentials™. Philadelphia, PA. American College of Physicians. STAT!Ref Online Electronic Medical Library. <http://online.statref.com/document.aspx?fxid=92&doid=61>.

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Laboratory and other studies for Acute Pancreatitis

| Test | Notes |
|-----------------|---|
| Serum amylase | <ul style="list-style-type: none"> ✓3 times upper limit of normal = dx acute pancreatitis ✓Levels quickly rise within 12 hrs after symptoms occur and return to nl in 3-5 days ✓Levels may be normal in 19-32% of cases esp. in chronic alcohol abuse ✓Hypertriglyceridemia may interfere with the amylase assay with falsely low results ✓Increased serum amylase levels can occur from intra-abdominal inflammatory conditions, salivary gland pathologies, or decreased renal clearance ✓Specificity of ~95% and sensitivity as low as 61% if cut off level is 3x normal or 1000IU/l |
| Serum lipase | <ul style="list-style-type: none"> ✓Lipase activity remains increased from 8 to 14 days with a greater sensitivity level ✓Increased serum lipase levels can occur from intra-abdominal pathologies or in renal insufficiency ✓Specificity of ~95% and sensitivity between 55% to 100% if cut off level is 600IU/l |
| Total bilirubin | ✓Elevated > 3 mg/dL not uncommon, however, common bile duct obstruction levels higher |
| ALT | ✓3 times upper limit of normal in acute pancreatitis = 95% positive predictive value for gallstone pancreatitis |
| Triglycerides | ✓Levels > 1000 mg/dL suggest the cause is hypertriglyceridemia |
| CBC | ✓WBC's can be elevated between 10,000-25,000 / μL without infection present |

National Guideline Clearinghouse: Tenner, S., Baillie, J., Dewitt, J., & Vege, S.S. (2013). American College of Gastroenterology guideline: Management of acute pancreatitis. *Am J Gastroenterology*, 108(9): 1400-1415. [157 references]

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Laboratory and other studies for Acute Pancreatitis

| Test | Notes |
|--|---|
| U.S. Abdomen | ✓Assess for gallstones with first episode of acute pancreatitis; also, evaluate for choledocholithiasis |
| CT abdomen with contrast | <ul style="list-style-type: none"> ✓Use only if US is nondiagnostic due to obesity, gas, etc. ✓CT can miss or underestimate necrosis |
| MRI abdomen without contrast and with MRCP | <ul style="list-style-type: none"> ✓Useful if US is nondiagnostic or choledocholithiasis is suspected ✓Usually not used during initial presentation |
| CT abdomen without contrast | ✓Use only if iodinated contrast cannot be administered or if MRI is not possible |

National Guideline Clearinghouse: Baker, M.E., Nelson, R.C., Rosen, M.P., Blake, M.A., Cash, B.D., Hindman, N.M., Karel, I.R., Kaur, H., Porkowski, R.J., Qayum, A., & Yarnish, G.M. (2013). Expert Panel on Gastrointestinal Imaging. ACR Appropriateness Criteria® acute pancreatitis. [online publication]. Reston (VA): American College of Radiology (ACR); 11 p. [45 references]

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Case Study 4

- 72-year-old male
- Retired
- Complains of recent abdominal pain radiating to the back and groin
- Pain has worsened and he states he is having severe lumbar back pain
- Lightheadedness
- Medical Hx
 - Diabetes, HTN, Psoriasis, MVP
- Surgical Hx
 - Appendectomy, cholecystectomy
- Social Hx
 - Smoking since age 12
 - Occasional ETOH
 - Denies illicit drug use

Are there any additional subjective questions you would like to ask?

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VS: T: 98.3°F, HR: 105 bpm, BP: 100/65 mm Hg, RR: 18 breaths/min

CV: S₁S₂, RRR, no m/r/g; distal LE pulses diminished with discoloration of toes b/l

Abdomen: Tenderness below umbilicus with bluish discoloration; pulsatile mass ~ 6 cm

Are there any additional areas you would like to examine or perform specific tests to?

What is your diagnosis?

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ABDOMINAL AORTIC ANEURYSM WITH POSSIBLE DISSECTION

Abdomen: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4311176/>
The Abdominal Aortic Aneurysm. JGIM. 2015; October 15. Wikimedia Commons.
The New England Journal of Medicine. 369: February 26, 2013.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3541176/>



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Abdominal Aortic Aneurysm

- Definition: Transverse diameter of 3 cm or more
- Concern if abdominal aortic aneurysm > 5 cm
- Risk of AAA rupture
- < 4 cm diameter ~ 0%
 - 4-4.9 cm diameter ~ 0.5-5%
 - 5-5.9 cm diameter ~ 3-15%
 - 6-6.9 cm diameter ~ 10-20%
 - 7-7.9 cm diameter ~ 20-40%
 - > 8 cm diameter ~ 30-50%
- 5.5 cm is threshold diameter for elective surgical treatment
- 75% of aneurysms develop in the abdomen and 25% in the thoracic regions
 - Mortality is less in AAA than in thoracic aneurysms
 - AAA's measuring 5 cm are palpable in 80% of patients

White, A., & Broder J. (2012). Acute aortic emergencies – Part I: Aortic aneurysms. *Advanced Emergency Nursing Journal*, 34(3): 216-229.

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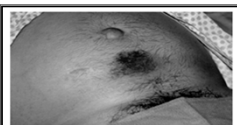
160

Abdominal Exam Clues: AAA

Triad of:

1. Tearing abdominal pain
2. Hypotension
3. Pulsatile abdominal mass

↓ d LE pulses / mottling



Imminent rupture:

- Abdominal / back pain
- Vomiting
- Syncope
- Claudication

Rupture

- Grey-Turner's Sign
- Cullen's Sign

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Silen, W. (2000). *Cope's Early Diagnosis of the Aortic Aneurysm* (Ed.). New York: Oxford University Press.

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Atypical Presentations of AAA

- Pain radiating to the groin
- Upper GI obstruction from compression of the third portion of the duodenum
- GI bleeding secondary to aortoenteric fistula usually involving the third part of the duodenum
- Hematuria
- Large bowel obstruction
- Priapism
- LE swelling related to a fistula from the aorta to IVC
- Acute femoral neuropathy with or without thigh ecchymosis due to femoral nerve compression

Nair, M. S., Uzzaman, M.M., Wahab, T.A., & Athow, A. (2010). Incarcerated hernia: atypical presentation of an abdominal aortic aneurysm. *Hernia*, 14:651-653.

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AAA Clinical Alerts

- Unrepaired AAA with no measurement in 1 year
- AAA diameter ≥ 3 cm
- AAA with endovascular graft and no CT scan for 1 year
- Unrepaired AAA (or AAA with endovascular graft) with back, flank, or abdominal pain

2013. ACP PIER & AHFS DI® Essentials™. Philadelphia, PA. American College of Physicians. STATRef Online Electronic Medical Library. <http://online.statref.com/document.aspx?fxid=92&docid=61>. 4/14/2013 6:40:46 PM CDT (UTC -05:00).

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Evidence-Based Recommendations

1. Encourage prevention and cessation of smoking to prevent AAA. **[B]**
2. Perform onetime screening with ultrasound to detect asymptomatic AAA in men aged 65 to 75 who have ever smoked. **[A]**
3. Consider using abdominal palpation to screen for AAA in men over age 65 when ultrasound is not feasible. **[C]**
4. Consider the spectrum of presenting symptoms of AAA. **[A]**

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6. Recognize the limitations of physical examination in diagnosing AAA in the asymptomatic or symptomatic patient. **[B]**
7. Use ultrasound or consider other imaging studies to confirm the diagnosis of AAA in asymptomatic patients. **[A]**
8. Consider the limited differential diagnosis of a pulsatile abdominal mass. **[C]**
9. Note that the effect of antihypertensives on the clinical course of AAA is as yet undetermined. **[B]**
10. Consider prescribing statins to slow the growth of AAA. **[B]**

2013. ACP PIER & AHFS DI® Essentials™. Philadelphia, PA. American College of Physicians. STATRef Online Electronic Medical Library. <http://online.statref.com/document.aspx?fxid=92&docid=61>.

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| Laboratory and other studies for Abdominal Aortic Aneurysm | |
|--|--|
| Test | Notes |
| CBC* | ✓Assess infection possibility |
| SMA7* | ✓Check liver and renal function |
| Pre-Surgery* | ✓Blood Type & Cross, clotting factors and platelets |
| UA* | ✓Rule out urinary tract infection |
| Cholesterol** | ✓Low HDL |
| U.S. Abdomen | ✓Assess and quantify the maximal anterior-posterior and transverse diameter of the aorta (non-invasive, non-ionizing, and inexpensive. Additionally, US estimates the orthogonal diameter which appears to give a more accurate size of the AAA. Sensitivity and specificity are 87.4-98.9% and 99.9% respectively. Obesity and bowel gas may decrease S&S overall though. |
| CT abdomen with contrast | ✓Provides a more accurate measurement of AAA morphology (important for surgical repair); however, exposes pt to ionizing radiation & IV contrast. CT better defines size, rostral-caudal extent, involvement of visceral arteries, and extension into the suprarenal aorta. Visualizes the retroperitoneum well. |
| MRI | ✓Similar imaging as in US and CT with possibly better imaging of branch vessels; however, not suitable in those who are unstable. No contrast dye needed and no ionizing radiation. |

* Usually performed prior to emergency surgery
 ** Increased incidence of AAA with low HDL levels
 Strayer, R.J., Shauer, P.L., & Hermann, L.K. (2012). Screening, evaluation, and early management of acute aortic dissection in the ED. *Current Cardiology Review*, 8:152-157.

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Case Study 5

- 68-year-old female
- Retired
- Presents with epigastric pain that occurs 15 to 60 minutes after eating.
- Two weeks ago she had presented with right lower quadrant pain, but no etiology was discovered.

- Medical Hx
 - Atrial fibrillation, coronary artery disease, osteoporosis, hypertension, hyperlipidemia, hyperthyroidism (resolved)
- Surgical Hx
 - Cholecystectomy

Are there any additional subjective questions you would like to ask?

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VS: T: 98.6°F, HR: 72 bpm, BP: 90/60 mm Hg, RR: 12 breaths/min

CV: S₁S₂, RRR, no m/r/g

Abdomen: Soft, non-tender, non-distended without peritoneal signs

Are there any additional areas you would like to examine or perform specific tests to?

What is your diagnosis?

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Mesenteric Ischemia

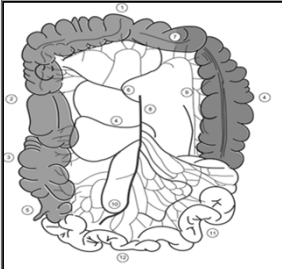
Harshaji (BMJ) 14:34, 24 July 2008 (UTC)
 File:Colonics bowel.jpg (2018, February 3) [Wikipedia Commons, Not Free] (https://commons.wikimedia.org/wiki/File:Colonics_bowel.jpg) (https://commons.wikimedia.org/wiki/File:Colonics_bowel.jpg) (https://commons.wikimedia.org/wiki/File:Colonics_bowel.jpg)



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Arterial System of the Intestines

File:Colonic blood supply.jpg (2018, September 9) [Wikipedia Commons, Not Free] (https://commons.wikimedia.org/wiki/File:Colonic_blood_supply.jpg) (https://commons.wikimedia.org/wiki/File:Colonic_blood_supply.jpg) (https://commons.wikimedia.org/wiki/File:Colonic_blood_supply.jpg)




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Abdominal Exam Clues: Ischemia

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 File:Colonics bowel PNG (2018, November 28) [Wikipedia Commons, Not Free] (https://commons.wikimedia.org/wiki/File:Colonics_bowel.PNG) (https://commons.wikimedia.org/wiki/File:Colonics_bowel.PNG) (https://commons.wikimedia.org/wiki/File:Colonics_bowel.PNG)

- Initial mildly tender to palpation without rebound or guarding
- Pain with eating
- Absent bowel sounds in region
- N/V frequent
- Diarrhea
- Advanced signs:
 - 1's abd distention
 - Ileus
 - Frank peritonitis
 - Shock



Silen, W (2000). Cope's Early Diagnosis of the Acute Abdomen. (20th Ed.). New York: Oxford University Press.
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Mesenteric Ischemia Clinical Alerts

- Clinical diagnosis is more important than diagnostic tests.
- In any patient >50 with known risk factors with sudden severe abdominal pain
- Sudden cramping, mild abdominal pain; urgent desire to defecate; passage of bright red or maroon blood OR bloody diarrhea
- Pain "out of proportion" to the physical exam is the hallmark of mesenteric ischemia or ischemic colitis

NOTE: Caution with elderly patients – minimal to no symptoms

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Evidence-Based Recommendations

1. Patients with acute abdominal pain out of proportion to physical findings and who have a history of cardiovascular disease should be suspected of having acute intestinal ischemia [B].
2. Patients who develop acute abdominal pain after arterial interventions in which catheters traverse the visceral aorta or any proximal arteries or who have arrhythmias (such as atrial fibrillation) or recent MI should be suspected of having acute intestinal ischemia [C].
3. Chronic intestinal ischemia should be suspected in patients with abdominal pain and weight loss without other explanation, especially those with cardiovascular disease [B].
4. Duplex ultrasound, CTA, and gadolinium-enhanced MRA are useful initial tests for supporting the clinical diagnosis of chronic intestinal ischemia [B].

Rafferty, J., Shellito, P., Hyman, N.H., Bue, W.D., & th Standards Committee of The American Society of Colon and Rectal Surgeons (2006). Practice parameters for sigmoid diverticulitis. *Diseases of the Colon and Rectum*, 49(7):939-944.

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Laboratory and other studies for Acute Mesenteric Ischemia

| Test | Notes |
|--------------------------|---|
| CBC* | ✓ Assess infection possibility |
| SMA7* | ✓ Check liver and renal function |
| Pre-Surgery* | ✓ Blood Type & Cross, clotting factors and platelets |
| UA* | ✓ Rule out urinary tract infection |
| Cholesterol** | ✓ Low HDL |
| U.S. Abdomen | ✓ Assess and quantify the maximal anterior-posterior and transverse diameter of the aorta (non-invasive, non-ionizing, and inexpensive. Additionally, US estimates the orthogonal diameter which appears to give a more accurate size of the AAA. Sensitivity and specificity are 87.4-98.9% and 99.9% respectively. Obesity and bowel gas may decrease S&S overall though. |
| CT abdomen with contrast | ✓ Provides a more accurate measurement of AAA morphology (important for surgical repair); however, exposes pt to ionizing radiation & IV contrast. CT better defines size, rostral-caudal extent, involvement of visceral arteries, and extension into the suprarenal aorta. Visualizes the retroperitoneum well. |
| MRI | ✓ Similar imaging as in US and CT with possibly better imaging of branch vessels; however, not suitable in those who are unstable. No contrast dye needed and no ionizing radiation. |

Brandt, L.J., Feuerstadt, P., Longstreth, G.F., & Boley, S.J. (2015). ACG Clinical Guidelines: Epidemiology, Risk Factors, Patterns of Presentation, Diagnosis, and Management of Colon Ischemia (CI). *American Journal of Gastroenterology*, 110: 18-44.

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Case Study 6

- 22-year-old male
- College student
- Presents with epigastric pain, nausea, vomiting, & fever since last night
- Says he ate at the campus dining room last night and had sushi
- Medical Hx
 - None
- Surgical Hx
 - None
- Allergies
 - None
- Illicit drugs
 - Marijuana occasionally when stressed, otherwise does not smoke

Are there any additional subjective questions you would like to ask?

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VS: T: 101.2°F, HR: 98 bpm, BP: 130/80 mm Hg, RR: 18 breaths/min

CV: S₁S₂, RRR, no m/r/g

Abdomen: Soft, epigastric tenderness without peritoneal signs; Psoas & Obdurator signs positive

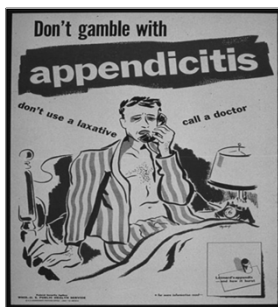
Are there any additional areas you would like to examine or perform specific tests to?

What is your diagnosis?

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Appendix

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Abdominal Exam Clues: Appendicitis

- Triad of:
 - Anorexia (74-78%)
 - Periumbilical pain with vomiting
 - Then RLQ pain (96%)
- Epigastric &/or periumbilical pain
- Nausea / Vomiting
- Slight temp
- Diarrhea / Constipation

- Epicritic hyperesthesia
- Britton's Sign
- Markle Sign

- McBurney's Sign
- Obturator's Sign
- Psoas Sign
- Rovsing's Sign



Silen, W. (2000). Cope's Early Diagnosis of the Acute Abdomen. (20th Ed.). New York: Oxford University Press.
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Acute Appendicitis Clinical Alerts:

- Fever
- Abdominal pain—rebound
- Leukocytosis
- Abnormal abdominal CT
- Abnormal abdominal ultrasound

Note: 1. Vomiting before Pain.....suggests gastroenteritis

2. Pain before Vomiting.....**suggests a surgical abdomen!!!!**

2013. ACP PIER & AHFS DI® Essentials™. Philadelphia, PA: American College of Physicians. STATRef Online Electronic Medical Library.
http://online.statref.com/document.aspx?bid=92&doid=61.
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Evidence-Based Recommendations

1. Identify features associated with acute appendicitis when obtaining history. **[A]**
2. Use history and physical exam findings consistent with acute appendicitis to risk stratify patients for further testing and mgmt **[A-B]**
3. Use lab tests to support the diagnosis. **[B]**
4. Consider radiographic imaging in selected patients. **[A]**
5. Consider the broad differential diagnosis. **[B]**

2013. ACP PIER & AHFS DIB Essentials™. Philadelphia, PA. American College of Physicians. STATRef Online Electronic Medical Library. <http://online.statref.com/document.aspx?docid=92&docid#61>.

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Laboratory & Other Studies for Acute Appendicitis

| Test | Sensitivity (%) | Specificity (%) | Likelihood Ratio Positive (95% CI) | Likelihood Ratio Negative (95% CI) |
|------------|------------------|------------------|---|---|
| CBC | | | For leukocyte count >10,000/uL: 2.5 (2.1-3.0) | For leukocyte count <10,000/uL: 0.3 (0.2-0.4) |
| | | | For neutrophil >75%: 2.4 (1.6-3.7) | For neutrophil <75%: 0.2 (0.2-0.5) |
| | | | For granulocyte >7000/uL: 1.6 (0.9-3.0) | For granulocyte <7000/uL: 0.3 (0.2-0.4) |
| CRP | | | 2.0 (1.6-2.5) | 0.3 (0.93-0.96) |
| Ultrasound | 86.7 (85.4-88.0) | 90.0 (88.9-91.2) | 13.3 (9.9-17.9) | 0.09 (0.93-0.96) |
| CT Scan | 94.0 (0.91-0.95) | 95.0 (0.93-0.96) | | |

2013. ACP PIER & AHFS DIB Essentials™. Philadelphia, PA. American College of Physicians. STATRef Online Electronic Medical Library. <http://online.statref.com/document.aspx?docid=92&docid#61>.

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Case Study 7

- 28 y/o female with abdominal pain and N/V, s/p C-section 4 days prior
- Last BM 2 days ago
- Medical Hx
 - None
- Surgical Hx
 - C-Section

Are there any additional subjective questions you would like to ask?

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VS: T: 100.2°F, HR: 88 bpm, BP: 130/78 mm Hg, RR: 14 breaths/min

CV: S₁S₂: RRR, no m/r/g

Abdomen: Taut, generalized tenderness without peritoneal signs;
BS's tympanic

Are there any additional areas you would like to examine or perform specific tests to?

What is your diagnosis?

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Intestinal Obstruction



Close loop Small bowel obstruction in 30 year old lady who has a surgical history of appendectomy 8 years ago

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DIFFERENTIAL DIAGNOSIS

- Small bowel obstruction
- Adynamic ileus

DIAGNOSIS

- Small bowel obstruction secondary to adhesions
- Diagnosis confirmed after surgery for lysis of adhesions

Courtesy of Michael Reber
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**Abdominal Exam Clues:
Small Bowel Obstruction**

- Cramps (around umbilicus or epigastrium)
- Vomiting
- Obstipation
- Hyperactive, high pitched peristalsis with rushes coinciding with cramps
- Abdomen non-tender
- Strangulation
 - Severe, steady pain
 - Oliguria / shock
- Partial obstruction
 - Diarrhea
- Infarction
 - Abdomen tender
 - Auscultation - silent

2014 Merck Manual: http://www.merckmanuals.com/professional/gastrointestinal_disorders/acute_abdomen_and_surgical_gastroenterology/intestinal_obstruction.html
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**Abdominal Exam Clues:
Large Bowel Obstruction**

- Milder symptoms than small bowel
- Increasing constipation to obstipation
- Vomiting
- Lower abdominal cramping without BM
- Distended abdomen
- Loud borborygmi
- No tenderness
- ? Palpable mass if tumor is cause of obstruction
- Rectum empty of feces

2014 Merck Manual: http://www.merckmanuals.com/professional/gastrointestinal_disorders/acute_abdomen_and_surgical_gastroenterology/intestinal_obstruction.html
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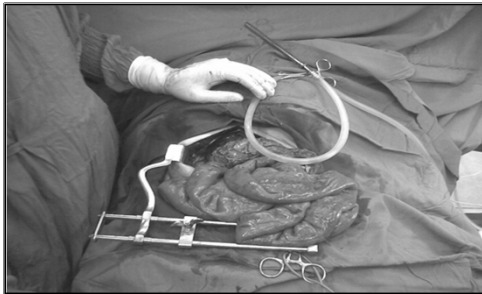
Abdominal Exam Clues: Obstruction

Volvulus

- Abrupt onset
- Pain is continuous
- Occasionally waves of colicky pain



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 2014 Merck Manual
http://www.merckmanuals.com/professional/gastrointestinal_disorders/acute_abdomen_and_surgical_gastroenterology/intestinal_obstruction.html
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 2014 Merck Manual
http://www.merckmanuals.com/professional/gastrointestinal_disorders/acute_abdomen_and_surgical_gastroenterology/intestinal_obstruction.html
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Hernia



A large right sided hernia

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 multiproprietary repository and open content encyclopedia.
 Retrieved from <https://commons.wikimedia.org/wiki/File:Hernia.jpg#/media/File:Hernia.jpg>
 2014 Merck Manual
http://www.merckmanuals.com/professional/gastrointestinal_disorders/acute_abdomen_and_surgical_gastroenterology/intestinal_obstruction.html
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Obstruction Clinical Alerts

- 1. The most common causes of obstruction are adhesions, hernias, and tumors
- 2. Vomiting and third spacing of fluid causes volume depletion
- 3. Prolonged obstruction can cause bowel ischemia, infarction, and perforation

2014 Merck Manual http://www.merckmanuals.com/professional/gastrointestinal_disorders/acute_abdomen_and_surgical_gastroenterology/intestinal_obstruction.html

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Evidence-Based Recommendations

- 1. Abdominal radiography is an effective initial examination in patients with suspected intestinal obstruction [C].
- 2. Computed tomography is warranted when radiography indicates high-grade intestinal obstruction or is inconclusive [C].
- 3. Antibiotics can protect against bacterial translocation and subsequent bacteremia in patients with intestinal obstruction [C].

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- 4. Clinically stable patients can be treated conservatively with bowel rest, intubation and decompression, and IV fluid resuscitation [A].
- 5. Surgery is warranted in patients with intestinal obstruction that does not resolve within 48 hours after conservative therapy is initiated [B].

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| Laboratory and other studies for Intestinal Obstruction: <i>Small Bowel</i> | |
|---|--|
| Test | Notes |
| CBC | ✓WBC may be elevated with left shift; increased hematocrit may indicate dehydration |
| SMA7 | ✓Usually normal or slightly elevated; elevated BUN & creatinine levels may indicate dehydration; |
| LFT's, Phosphate & CK | ✓Evaluate & exclude biliary or hepatic disease |
| UA | ✓Evaluate for infection, dehydration |
| Plain X-rays | ✓2 views: supine and upright – evaluate air/fluid sign |
| Enteroclysis (Barium enema) | ✓Can detect partial and complete blockages as well as distinguish between adhesions & metastases. ✓Do NOT use if there is a possibility of either bowel ischemia or perforation |
| CT Scan | ✓Detect strangulated obstruction, adhesions, hernias, neoplasms and Crohn's disease. Additionally, distinguishes between ileus and mechanical SBO in post-op patients ✓No oral contrast necessary as the retained fluid provides a natural contrast agent |

Di Salverio, S., Cocolini, F., Galati, M., Smerieri, N., Biffi, W.L., Ansaloni, L., ... & Catena, F. (2013). Bologna guidelines for diagnosis and management of adhesive small bowel obstruction (ASBO): 2013 update of the evidence-based guidelines from the World Society of Emergency Surgery ASBO Working Group. *World J Emerg Surg*, 8(1), 42. Copyright Zikus 2019 196

| Laboratory and other studies for Intestinal Obstruction: <i>Large Bowel</i> | |
|---|---|
| Test | Notes |
| CBC | ✓WBC may be elevated with left shift; ✓Increased hematocrit may indicate dehydration; decreased hematocrit may suggest iron deficiency anemia and possible lower GI bleed (?colon cancer) |
| SMA7 | ✓Elevated BUN & creatinine levels may indicate dehydration |
| Serum lactate | ✓Evaluate for bowel ischemia |
| Stool guaiac | ✓Evaluate for bleeding |
| Plain X-rays | ✓Upright chest x-ray to evaluate for free air under the diaphragm ✓Supine and upright abdomen x-rays to distinguish between constipation and obstruction |
| CT Scan | ✓Imaging of choice if there is a colonic obstruction ✓Use contrast (po/IV) to determine if obstruction is partial or complete; if there is an ileus or a SBO ✓If a perforation is suspected, Gastrografin is recommended (water-soluble contrast) |

Frago, R., Ramirez, E., Milan, M., Kreisler, E., del Valle, E., & Blondo, S. (2014). Current management of acute malignant large bowel obstruction: A systematic review. *The American Journal of Surgery*, 207(1), 127-138. Copyright Zikus 2019 197

Case Study 8

- 24 year-old woman with lower left abdominal pain that has been worsening x 5 days
- + N/V
- Noticed this AM she is now having shoulder pain
- Vaginal spotting
- Medical Hx
 - Chlamydial cervicitis x1
- Surgical Hx
 - None

Are there any additional subjective questions you would like to ask?

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VS: T: 98.9°F, HR: 88 bpm,
 BP: 140/80 mm Hg,
 RR: 14 breaths/min

CV: S₁S₂, RRR, no m/r/g

Abdomen: Tender to palpation LLQ with rebound tenderness

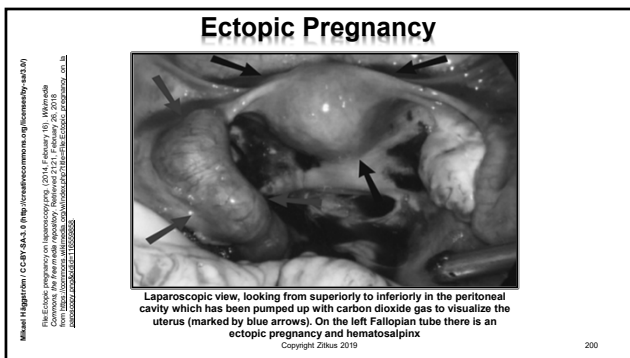
GYN: Cervical motion tenderness, right lower mass palpable on pelvic exam

- CBC within normal limits
- CMP within normal limits
- UA with trace leukocyte esterase, moderate bacteria/HPF and 1 WBC but also with 30 epithelial cells/HPF
- Qualitative BHCG - Positive
- Serum BHCG - 6350 mIU/mL

Are there any additional areas you would like to examine or perform specific tests to?

What is your diagnosis?

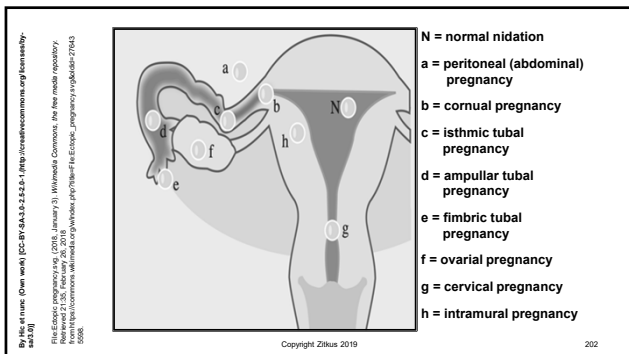
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Abdominal Exam Clues: Ectopic Pregnancy

- Syncope
- Tenesmus
- Abd tenderness, pelvic & / or shoulder pain
- Irregular vaginal bleeding

Silen, W. (2000). Cope's Early Diagnosis of the Acute Abdomen. (20th Ed.). New York: Oxford University Press.
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Ectopic Pregnancy Clinical Alerts

1. Most ectopic pregnancies occur between six and eight weeks of gestation
2. 98% of ectopic pregnancies occur in the fallopian tube
3. Any woman of childbearing age who presents with abdominal pain must be given a β -hCG pregnancy test

Mnemonic: PIDAS

Risk factors for ectopic pregnancy:

- P** – Prior ectopic pregnancy, prior abdominal or gynecological surgery
- I** – IUD use / Infection
- D** – DES exposure in utero / Damaged tubes
- A** – Use of assisted reproductive technology (ART)
- S** – Smoking hx during reproductive age

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Evidence-Based Recommendations

1. Consider the diagnosis of ectopic pregnancy in all women with abdominal pain with or without vaginal bleeding and a positive pregnancy test result **[B/C]**.
2. Consider the diagnosis of ectopic pregnancy when pregnancy occurs as the result of progestin only contraception failure or with an IUD in place **[B]**.
3. Do a complete examination of the abdomen and pelvis **[B/C]**.

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4. Obtain serial serum hCG levels **[B/C]**.
5. Obtain a single serum progesterone level **[B/C]**.
6. Obtain a transvaginal ultrasound in all women with an early pregnancy complication, regardless of symptoms **[A]**.
7. Consider other disorders in women with clinical signs and symptoms similar to ectopic pregnancy and with a positive pregnancy test result **[B]**.

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| Laboratory and other studies for Ectopic Pregnancy | |
|--|---|
| Test | Notes |
| β-hCG, Serum | ✓ Pregnancy – serial quantitative levels normally increase by ~ 66% every 48hrs in the first 8 weeks |
| Progesterone, Serum | ✓ < 3.2 ng/mL ruled out a viable pregnancy in 99.2% of women ✓ > 20 ng/mL associated with lower risk of ectopic pregnancy |
| Ultrasound | ✓ Evaluate for viable or non-viable intrauterine pregnancy; transvaginal US effective; however, often fails to identify the location of the pregnancy ✓ β-hCG & US Stats ✓ Absence of intrauterine gestational sac and β-hCG concentration over 6500 IU/l = Sensitivity 100% & Sensitivity 96%. |
| Laparoscopy (diagnostic) | ✓ If the US is inconclusive, the "gold standard" to investigate a possible ectopic pregnancy is the diagnostic laparoscopy. |

Kirk, E., Bottomley, C., & Bourne, T. (2014). Diagnosing ectopic pregnancy and current concepts in the management of pregnancy of unknown location. *Human Reproduction Update*, 20(2): 250-261. Copyright Zikus 2019 206

Case Study 9

- 57 year-old woman with abdominal pain s/p colonoscopy one day ago
- + Nausea
- Worsened overnight
- Some bleeding from the rectum, but just spotting

- Medical Hx
 - HTN, hyperlipidemia, arthritis
- Surgical Hx
 - Appendectomy, cholecystectomy, colectomy, partial thyroidectomy

Are there any additional subjective questions you would like to ask?

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VS: T: 101.9°F, HR: 88 bpm, BP: 140/80 mm Hg, RR: 14 breaths/min

CV: S₁S₂, RRR, no m/r/g

Abdomen: Tender to palpation RUQ with peritoneal sign, +guarding

Are there any additional areas you would like to examine or perform specific tests to?

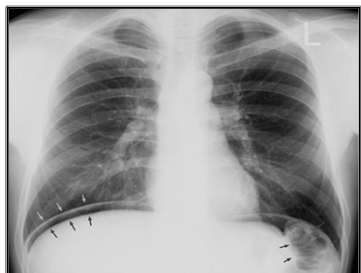
What is your diagnosis?

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Perforated Viscus

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Abdominal Exam Clues: Perforation

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- Sharp, severe, sudden onset epigastric pain
- Hypotension / Tachycardia
- Fever
- Abdominal rigidity / ↓ BS
- Shoulder pain (Kehr's Sign)
- Markel Sign
- Hiccups (late)



Silen, W. (2000). Cope's Early Diagnosis of the Acute Abdomen. (2nd Ed.). New York: Oxford University Press.

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| Perforation | Cause |
|--------------------|---|
| Esophagus | • Forceful vomiting |
| Duodenum - Stomach | • Peptic ulcer disease |
| Intestine | • Acute appendicitis • Meckel's diverticulitis • Obstruction • Strangulation |
| Colon | • Diverticulitis • IBD – Ulcerative colitis or Crohn's disease • Obstruction • Toxic megacolon • Iatrogenic – colonoscopy or other diagnostic procedure |
| Gallbladder | • Iatrogenic – during surgery or liver biopsy • Acute cholecystitis (rare) |

Solomkin, J.S., Mazuski, J.E., Bradley, J.S., Rodvold, K.A., Goldstein, E.J., et al. (2010). Diagnosis and management of complicated intra-abdominal infection in adults and children: guidelines by the Surgical Infection Society and the Infectious Diseases Society of America. *Clinical Infectious Diseases*, 50(2):133-164. Copyright Zikus 2019 211

Perforation Clinical Alerts

- Bowel perforation is often a clinical diagnosis
- A diagnosis of ruptured bowel with peritonitis is a surgical emergency!
- Be mindful in evaluating patient's age and those with high comorbidities to prevent delay of diagnosis & treatment

Risk Factors

- A** – Appendicitis
- C** – Crohn disease
- D** – Diverticulitis
- I** – Ischemia (acute/chronic)
- I** – Iatrogenic (procedures/surgery)
- M** – Malignancy
- P** – Peptic ulcer disease
- T** – Trauma (blunt / penetrating)
- Z** - Zollinger-Ellison syndrome

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Evidence-Based Recommendations

- Routine history, physical examination, and laboratory studies will identify most patients with suspected intra-abdominal infection for whom further evaluation and management is warranted **[A]**.
- For selected patients with unreliable physical examination findings, such as those with an obtunded mental status or spinal cord injury or those immunosuppressed by disease or therapy, intra-abdominal infection should be considered if the patient presents with evidence of infection from an undetermined source **[B]**.

Solomkin, J.S., Mazuski, J.E., Bradley, J.S., Rodvold, K.A., Goldstein, E.J., et al. (2010). Diagnosis and management of complicated intra-abdominal infection in adults and children: guidelines by the Surgical Infection Society and the Infectious Diseases Society of America. *Clinical Infectious Diseases*, 50(2):133-164. Copyright Zikus 2019 213

3. Further diagnostic imaging is unnecessary in patients with obvious signs of diffuse peritonitis and in whom immediate surgical intervention is to be performed [B].

4. In adult patients not undergoing immediate laparotomy, computed tomography (CT) scan is the imaging modality of choice to determine the presence of an intra-abdominal infection and its source [A].

Solomkin, J.S., Mazuski, J.E., Bradley, J.S., Rodvold, K.A., Goldstein, E.J., et al. (2010). Diagnosis and management of complicated intra-abdominal infection in adults and children: guidelines by the Surgical Infection Society and the Infectious Diseases Society of America. *Clinical Infectious Diseases*, 50(2):133-164.

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| Laboratory and other studies for Perforated Viscus | |
|--|---|
| Test | Notes |
| CBC with diff | ✓ Eval for leukocytosis and left shift |
| SMA7 with LFTs | ✓ Eval for physiological status; for metabolic acidosis; liver and renal function (these should be WNL) |
| Amylase & Lipase | ✓ Eval for possible hepatobiliary or pancreatic disorders |
| Chest x-ray | ✓ Most appropriate for suspected peptic ulcer perforation to eval for free air (subdiaphragm) |
| Supine & Upright x-rays of abdomen | ✓ Most appropriate for suspected bowel perforation to eval for free air (pneumoperitoneum) ✓ Evaluate for air/fluid levels in the peritoneum region (hydropneumoperitoneum or pyopneumoperitoneum) Note: Only use water-soluble radiologic contrast to detect any intraperitoneal leak |
| US Abdomen | ✓ Localized gas collection and thickened bowel loop can be obtained from an US with the perforation site ✓ Can also eval other organs, e.g., liver, spleen, pancreas, kidneys, ovaries, adrenals, & uterus |
| CT Abdomen | ✓ Allows for additional morphologic information than x-ray or US |
| Laparoscopy | ✓ Used if unable to ascertain perforation and pt in acute abdominal pain |

Gourgiotis, S., Liakos, N., Gemenetzis, G., Seretis, C., Aloizos, S., Vougas, V., & Drakopoulos, S. (2013). Less common nontraumatic bowel perforations: Diagnosis and management through a retrospective study. *The American Surgeon*, 79(4): 381-387.

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RED FLAGS

POTENTIAL SURGICAL EMERGENCIES!



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| History | Physical Examination |
|---|---|
| <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Inability to maintain PO intake <input checked="" type="checkbox"/> Projectile vomiting <input checked="" type="checkbox"/> Overt gastrointestinal blood loss <input checked="" type="checkbox"/> Syncope <input checked="" type="checkbox"/> Pregnancy <input checked="" type="checkbox"/> Recent surgery or endoscopic procedure <input checked="" type="checkbox"/> Fever <input checked="" type="checkbox"/> Caustic or foreign body ingestion | <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Pathologic changes in VS <input checked="" type="checkbox"/> Bloody, maroon, or melanic stool <input checked="" type="checkbox"/> Hernia (incarcerated and tender) <input checked="" type="checkbox"/> Hypoxia <input checked="" type="checkbox"/> Cyanosis <input checked="" type="checkbox"/> Altered mentation <input checked="" type="checkbox"/> Jaundice <input checked="" type="checkbox"/> Peritoneal signs <input checked="" type="checkbox"/> Abdominal pain out of proportion to examination |

Rasaz, M.H. & Goldberg, E. (2006). Acute abdominal pain. The Medical Clinics of North America, 90, 481-503.
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| Laboratory Results | Radiography |
|--|--|
| <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Renal failure <input checked="" type="checkbox"/> Metabolic acidosis <input checked="" type="checkbox"/> Leukocytosis <input checked="" type="checkbox"/> Elevated transaminases <input checked="" type="checkbox"/> Elevated alkaline phosphatase & bilirubin <input checked="" type="checkbox"/> Anemia or polycythemia <input checked="" type="checkbox"/> Hyperlipasemia and/or hyperamylasemia <input checked="" type="checkbox"/> Hyperglycemia or hypoglycemia | <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Abdominal free air <input checked="" type="checkbox"/> Gallbladder wall thickening <input checked="" type="checkbox"/> Pericholecystic fluid <input checked="" type="checkbox"/> Dilated biliary tree <input checked="" type="checkbox"/> Bowel obstruction <input checked="" type="checkbox"/> Dilated small bowel loops ± air fluid levels <input checked="" type="checkbox"/> Intra-abdominal abscess <input checked="" type="checkbox"/> Bowel wall thickening <input checked="" type="checkbox"/> Air in the portal venous system <input checked="" type="checkbox"/> Pneumatosis intestinalis |

Rasaz, M.H. & Goldberg, E. (2006). Acute abdominal pain. The Medical Clinics of North America, 90, 481-503.
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Making the Correct Diagnosis

- Use your knowledge of anatomy, physiology and pathology
- Obtain information from patient by listening, looking and touching
- Collect the correct facts and don't make quick decisions
 - Review your past clinical experiences

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Thank You

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