

## Abdominal Pain: How to determine if an abdomen is acute or not!

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Workshop Handout: [www.zitkus.com](http://www.zitkus.com)

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## Objectives

1. Differentiate the various types & causes of abdominal pain
2. Identify appropriate history & physical exam
3. Discuss various physical exam techniques
4. Review abdominal pain in special populations
5. Practice abdominal exam techniques
6. Discuss the top ten causes of abdominal pain including evaluation and treatment

Disclosure: I have no current affiliation or financial arrangement with any grantor or commercial interests that might have direct interest in the subject matter of this CE Program.

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## History of Surgery

- Egyptians
- Babylonians & Hammurabid Code
- Ancient Hindus

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## Egyptian Surgery Practices: 2500 B.C.

- Knowledge of anatomy from mummies
- Treated wounds and broken bones and dealing with boils and abscesses
- Used clamps, sutures and cauterization
- Had surgical instruments like probes, saws, forceps, scalpels and scissors
- Knew that honey helped to prevent wounds becoming infected (It is a natural antiseptic)
- Dressed wounds with willow bark, which has the same effect as honey

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## Babylonians & Hammurabi Code: 1700 B.C.

# 215 If a physician make a large incision with a operating knife and cure it, or if he open a tumor [over the eye] with an operating knife, and saves the eye, he shall receive ten shekels in money.

# 218 If a physician make a large incision with the operating knife, and kill him, or open a tumor with the operating knife, and cut out the eye, his hands shall be cut off.

#219 If a physician make a large incision in the slave of a freed man, and kill him, he shall replace the slave with another slave.

#221 If a physician heal the broken bone or diseased soft part of a man, the patient shall pay the physician five shekels in money.

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Obtained April 11, 2010 from <http://history-world.org/hammarabicode.htm>

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## Ancient Hindus Excelled at Surgery

- Great Surgical Textbook: *Susruta Samhita*
- Described 20 sharp & 101 blunt surgical instruments
- Used lancets to perform cataract surgery, scalpels to restore amputated noses via plastic surgery, and sharp knives to remove bladder stones.
- Covers all aspects ophthalmology, ENT and head diseases, general medicine, toxicology, social and preventive medicine, pharmacology, dietary regimen and behavioral regimen in addition to pediatrics and geriatrics.

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Obtained on April 11, 2010 from <http://www.archive.org/details/englishtranslati00susuoft>

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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 practice 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*

Sir Zachary Cope (1881-1974)

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Knowledge of anatomy, physiology, pathophysiology and pain generation and perception is imperative in formulating a differential diagnosis in an individual with abdominal pain!

Flasar, M.H., & Goldberg, E. (2006). Acute abdominal pain. *Med Clin N Am* 90, pg 481.

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How to determine your diagnosis?

DIAGNOSIS

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Age & Sex: Abdominal Pain Correlates

Age / Sex	Conditions
Newborn	Congenital anomalies, gut atresia, imperforate anus, malrotation, diaphragmatic hernia
Neonatal	Hypertrophic pyloric stenosis (males), megacolon, hernia
Infancy	Intussusception
Childhood & Young Adults	Hernia, appendicitis (most common but can occur at any age)
Young Adolescent Females	"mittelschmerz" – rupture of graafian follicle with LLQ or RLQ pain in middle of menstrual cycle
Females	Gallbladder – female, fair, fat, forty Ectopic pregnancy disease
Males	Peptic ulcer
Advancing Age	Mesenteric thrombosis or embolus often after MI, large bowel neoplasms, diverticulitis
Surgical Hx	Abdominal adhesions

Kapadia, C.R., Taylor, C.R., & Crawford, J.M. (2003). *An Atlas of Gastroenterology: A Guide to Diagnosis & Differential Diagnosis*. New York: The Parthenon Publishing Group.

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Acute Abdominal Pain:  
Age = / > 55 y/o

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- **Biliary colic / cholecystitis** (12-20%)
- **Appendicitis** (4 – 15%)
- **Intestinal obstruction** (12%)
- **Perforated viscus** (7%)
- **Diverticulitis** (6%)
- **Incarcerated hernia** (4%)
- **Renal colic / nephrolithiasis** (4%)
- **Cancer** (4%)

National Center for Health Statistics

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### Acute Abdominal Pain: Age = / < 55 y/o

– <b>Appendicitis</b>	(9%)
– <b>Cholecystitis</b>	(5%)
– <b>Intestinal obstruction</b>	(<1%)
– <b>Diverticulitis</b>	(<1%)
– <b>Cancer</b>	(<1%)

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National Center for Health Statistics
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Digestive Disease Statistics

- **Prevalence**
  - 60 – 70 million people affected by all digestive diseases
- **Mortality**
  - 234,000 deaths including deaths from cancer (2002)
- **Hospitalizations**
  - 14 million – 9 percent (2002)
- **Diagnostic & Therapeutic Procedures**
  - 6 million – 14 percent of all in-patient hospitalization procedures (2002)
- **Ambulatory Care Visits**
  - 45 million (1999-2000)
- **Disability**
  - 1.9 million people (1990-1992)
- **Costs**
  - \$107,000 billion (1992)

National Institute of Diabetes and Digestive and Kidney Diseases (NIH) and NDDIC, 2008  
 Obtained from <http://digestive.niddk.nih.gov/statistics/statistics.htm>

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### Mortality Rates (2002)

• Gallstones	636,000
• Chronic Liver Disease & Cirrhosis	27,257
• Viral Hepatitis	5,793
• Peptic Ulcer	4,079
• Pancreatitis	3,532
• Diverticular Disease	3,324
• Infectious Diarrhea	2,481
• GERD & Related Esophageal Disorders	1,707
• Abdominal Wall Hernia	1,143
• Inflammatory Bowel Disease	825
• Gastritis & Non-ulcer Dyspepsia	362
• Constipation	121
• Irritable Bowel Syndrome	22
• Hemorrhoids	18

National Institute of Diabetes and Digestive and Kidney Diseases (NIH) and NDDIC, 2005

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### Office Visits (per thousand)

General medical examination	6.2%	Test results	1.4%
Progress visit	5.3%	Stomach pain, cramps, spasms	1.4%
Postoperative visit	2.9%	Diabetes Mellitus	1.4%
Cough	2.8%	Depression	1.3%
Prenatal exam, routine	2.7%	Back symptoms	1.3%
Medication	1.8%	Skin rash	1.3%
Gynecological examination	1.6%	Vision dysfunctions	1.2%
Hypertension	1.6%	Well-baby exam	1.2%
Throat symptoms	1.6%	Headache, pain in head	1.2%
Knee symptoms	1.6%	Earache or ear infection	1.1%
		<b>All other reasons</b>	<b>58.9%</b>

Hing, E., Cherry, D.K., & Woodwell, D.A. (2006). National Ambulatory Medical Care Survey: 2004 Summary. *CDC Advance Data from Vital and Health Statistics*, 374, 17.

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### How to determine your diagnosis?

Pain....

Acute / Chronic

A&P

Generation & Perception

**DIAGNOSIS**

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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*, 2<sup>nd</sup> ed. Churchill Livingstone, London, 1991.  
 Silen, W. *Cope's Early Diagnosis of the Acute Abdomen*, 20<sup>th</sup> 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*, 2<sup>nd</sup> ed. Churchill Livingstone, London, 1991.  
Silen, W. *Cope's Early Diagnosis of the Acute Abdomen*, 20<sup>th</sup> ed. Oxford University Press, New York, 2000.

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## Anatomy & Physiology

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## Pain: Generation & Perception

	Visceral	Parietal	Referred
Noiception	Dull ache	Sharp	Dull / Sharp
Location	Midline - Generalized - Innervation of viscera B/L	Specific - Localized - Innervation is unilateral with lateralization of pain	Vague & well localized - Innervation is bilateral & unilateral
Cause	- Stretching - Distension - Torsion - Contraction	- Direct irritation to the peritoneal lining	- Visceral afferents & spinal somatic afferents enter spinal cord at same level

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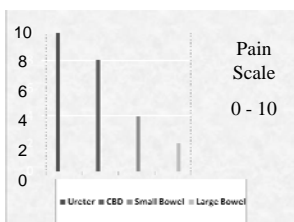
## Hollow Organ Pain

- Peristalsis
  - Intermittent muscle contractions
  - Crescendo – Decrescendo
  - Waxes & wanes
    - GI Tract
    - Ureters
    - Bladder
    - Gallbladder
    - Uterus

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## Hollow Organs



- Colicky Pain
- Intensity depends on circumference of lumen
- Pain caused by stretching & distention of hollow organ

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## Importance of Anatomy & Physiology in Assessment

Diffuse Pain	RUQ Pain	LUQ Pain	RLQ Pain	LLQ Pain
<ul style="list-style-type: none"> <li>• Peritonitis</li> <li>• Pancreatitis</li> <li>• Leukemia</li> <li>• Sickle Cell Crisis</li> <li>• Early Appendicitis</li> <li>• Mesenteric Adenitis</li> <li>• Mesenteric Thrombosis</li> <li>• Gastroenteritis</li> <li>• Aneurysm</li> <li>• Colitis</li> <li>• Intestinal Obstruction</li> <li>• Metabolic Cause</li> <li>• Toxic Overdose</li> <li>• Bacterial Infection</li> </ul>	<ul style="list-style-type: none"> <li>• Gall Bladder</li> <li>• Biliary Tract</li> <li>• Hepatitis</li> <li>• Hepatomegaly due to CHF</li> <li>• Peptic Ulcer</li> <li>• Pancreatitis</li> <li>• Retrocaecal Appendicitis</li> <li>• Renal Pain</li> <li>• Herpes Zoster</li> <li>• Myocardial Ischemia</li> <li>• Pericarditis</li> <li>• Pneumonia</li> <li>• Empyema</li> </ul>	<ul style="list-style-type: none"> <li>• Gastritis</li> <li>• Pancreatitis</li> <li>• Splenic Enlargement</li> <li>• Splenic Rupture</li> <li>• Splenic Infarction</li> <li>• Splenic Aneurysm</li> <li>• Renal Pain</li> <li>• Herpes Zoster</li> <li>• Myocardial Ischemia</li> <li>• Pneumonia</li> <li>• Empyema</li> </ul>	<ul style="list-style-type: none"> <li>• Appendicitis</li> <li>• Intestinal Obstruction</li> <li>• Regional Enteritis</li> <li>• Diverticulitis</li> <li>• Cholecystitis</li> <li>• Perforated Ulcer</li> <li>• Leaking Aneurysm</li> <li>• Abdominal Wall Hematoma</li> <li>• Ectopic Pregnancy</li> <li>• Ovarian Cyst</li> <li>• Ovarian Torsion</li> <li>• Salpingitis</li> <li>• Ovarian Cyst</li> <li>• Ovarian Torsion</li> <li>• Endometriosis</li> <li>• Uteral Calculi</li> <li>• Renal Pain</li> <li>• Endometriosis</li> <li>• Uteral Calculi</li> <li>• Renal Pain</li> <li>• Seminal Vesiculitis</li> <li>• Psoas Abscess</li> </ul>	<ul style="list-style-type: none"> <li>• Diverticulitis</li> <li>• Intestinal Obstruction</li> <li>• Appendicitis</li> <li>• Leaking Aneurysm</li> <li>• Abdominal Wall Aneurysm</li> <li>• Ectopic Pregnancy</li> <li>• Mittelschmerz</li> <li>• Ovarian Cyst</li> <li>• Ovarian Torsion</li> <li>• Salpingitis</li> <li>• Endometriosis</li> <li>• Uteral Calculi</li> <li>• Renal Pain</li> <li>• Seminal Vesiculitis</li> <li>• Psoas Abscess</li> </ul>

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**How to determine your diagnosis?**

Acute vs Non-Acute.....  
 Various issues  
 seen both  
 in  
 Health care Providers  
 &  
 Patients

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**Acute Abdominal Pain**

“Historically, diagnosis of the causes of acute abdominal pain has been based largely on pattern recognition, in which clinicians attempt to match new cases to preexisting stereotypes of various diseases.”

“Certainly knowledge of these classic presentations is basic to successful diagnosis, but it is crucial to remember that at least one third of patients with acute abdominal pain exhibit atypical features that render pattern recognition unreliable.”

Delcore, R., & Cheung L.Y. (2006). Acute abdominal pain: Assessment of acute abdominal pain. Obtained 8/8/07 from <http://www.medscape.com/viewarticle/535548>

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1. Abdominal pain may be mild even in an acute abdomen
  2. Simple human mistakes
  3. Patient causes
  4. Unfamiliarity of the causes of an acute abdomen
  5. Female anatomy structures
  6. Challenges
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**How to determine your diagnosis?**

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

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What to expect,  
 but not always,  
 in specific  
 abdominal pain  
 differentials.....

**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 Acute Abdomen*. (20<sup>th</sup> Ed.). New York: Oxford University Press.

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### Abdominal Exam Clues: Appendicitis

- Epigastric &/or periumbilical pain
- Nausea / Vomiting
- Slight temp
- Diarrhea / Constipation
- Triad of:
  1. Anorexia (74-78%)
  2. Periumbilical pain with vomiting
  3. Then RLQ pain (96%)
- Britton's Sign
- Epicritic hyperesthesia
- Markle Sign
- McBurney's Sign
- Obturator's Sign
- Psoas Sign
- Rovsing's Sign

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Silen, W. (2000). *Cope's Early Diagnosis of the Acute Abdomen*. (20<sup>th</sup> Ed.). New York: Oxford University Press.  
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### Abdominal Exam Clues: Cholecystitis

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

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Silen, W. (2000). *Cope's Early Diagnosis of the Acute Abdomen*. (20<sup>th</sup> Ed.). New York: Oxford University Press.  
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### Abdominal Exam Clues: Diverticulitis

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

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### Abdominal Exam Clues: Ischemia

- Acute periumbilical pain
- Pain with eating
- Absent bowel sounds in region
- N/V frequent
- Diarrhea
- Advanced signs:
  - ↑'s abd distention
  - Ileus
  - Frank peritonitis
  - Shock

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Silen, W. (2000). *Cope's Early Diagnosis of the Acute Abdomen*. (20<sup>th</sup> Ed.). New York: Oxford University Press.  
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### Abdominal Exam Clues: Obstruction

- Diarrhea (early)
- Constipation (late)
- Fever / tachycardia
- Pain crampy & intermittent
- Nausea / vomiting (bilious / fecal)

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Silen, W. (2000). *Cope's Early Diagnosis of the Acute Abdomen*. (20<sup>th</sup> Ed.). New York: Oxford University Press.  
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### Abdominal Exam Clues: Pancreatitis

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

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Silen, W. (2000). *Cope's Early Diagnosis of the Acute Abdomen*. (20<sup>th</sup> Ed.). New York: Oxford University Press.  
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### Abdominal Exam Clues: Perforation

- Sharp, severe, sudden onset epigastric pain
- Shoulder pain (Kehr's Sign)
- Hiccups (late)
- Tachycardia
- Fever
- Abdominal rigidity
- Markle Sign

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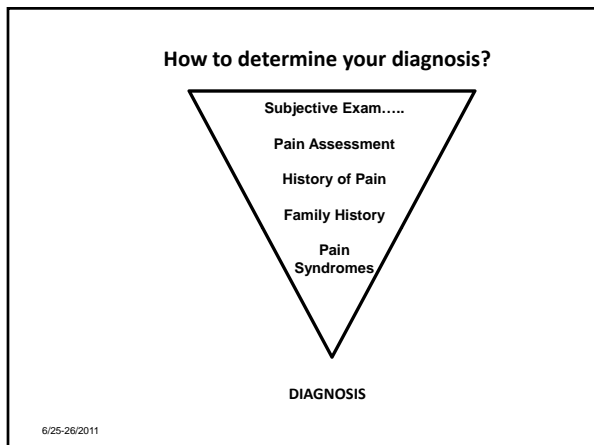
Silen, W. (2000). *Cope's Early Diagnosis of the Acute Abdomen*. (20<sup>th</sup> Ed.). New York: Oxford University Press.  
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### Abdominal Exam Clues: Ectopic

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

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Silen, W. (2000). *Cope's Early Diagnosis of the Acute Abdomen*. (20<sup>th</sup> Ed.). New York: Oxford University Press.  
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## History & Physical Examination

Signs & Symptoms  
Techniques

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### Clinical Evaluation

- **Methodical History**
  - Onset
  - Duration
  - Frequency
  - Character
  - Location
  - Chronology
  - Radiation
  - Intensity of the pain
  - Aggravating / Alleviating factors

1. Clinical evaluation is more important than any single lab finding or x-ray
2. Your clinical evaluation guides you in determining your differential diagnoses
3. Standardized history taking most important!

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### History of the Pain

Subjective Discussion

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## Medical History Questions

### PAIN Assessment

- **Intensity & Character**

- P Provocative-Palliative Factors
- Q Quality
- R Region
- S Severity
- T Temporal characteristics

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- **Pain History**

- **Time of Onset**

- Pain syndromes change over time
- Did it wake the patient up from sleep?

- **Location of the pain**

- May be difficult to localize specifically
- Changes in pain are important in the diagnosis

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- **Radiation**

- Occurs when pain fibers from affected organ are supplied by nerve roots that also have cutaneous sensory distribution

- **Aggravating & Alleviating Factors**

- Peritonitis: **Lie motionless**
- Renal Colic: **Writhe, unable to find a comfortable position**
- Fatty Foods: **Biliary colic**
- Improves with eating: **Duodenal ulcer**
- Worsens with eating: **Gastric ulcer, mesenteric ischemia**

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- **Changes in stool frequency / character**

- Color / caliber
- Constipation
- Diarrhea

- **Associated symptoms**

- Fever
- Nausea
- Vomiting

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- Flatulence
- Prior abdominal surgeries
- History of CAD

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- Also consider potential blockage of the following areas:

- Lower extremities = PAD
- Mesenteric arteries = Mesenteric Ischemia
- Carotid Arteries = TIA, Stroke

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- **Family history of abdominal pain syndromes**

- Sickle cell anemia

- Mediterranean fever

- › Familial Mediterranean fever (inherited disorder) occurs most commonly in people of non-Ashkenazi Jewish, Armenian, Arab and Turkish backgrounds
- › Recurrent episodes of fever and peritonitis (inflammation of the abdominal membrane)

- **Medications** (May disguise or may be the cause of abdominal pain)

- Steroids
- Pain medications
- NSAIDS

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- Common recurrent abdominal pain syndromes
  - Peptic ulcer disease
  - Alcoholic pancreatitis
  - Gastritis
  - Nephrolithiasis
  - Cholelithiasis or cholecystitis

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How to determine your diagnosis?

Objective Exam.....

- Observation
- Inspection
- Auscultation
- Percussion
- Palpation

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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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## OBSERVATION

Is the person in need of immediate resuscitation?

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## Immediate Assessment

- **Vital Signs**
  - Pulse rate
  - Blood pressure
  - Respiratory rate
- **Beware of the following:**
  - Pulse rate > 100 / minute
  - Systolic BP < 90mm Hg
  - Respiratory Rate > 25 / minute

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## Medical Emergencies often overlooked

- **Ruptured abdominal aortic aneurysm**
- **Ruptured ectopic pregnancy**
- **Septic shock**
  - Peritonitis

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## Exam Pointers

The physical examination consists of:

- Vital signs
- Mental Status / Neuro
- Chest
  - Heart & Lungs
- Extremities / Skin
- Rectal exam
- Rectovaginal exam
- Abdomen
  - Inspection
  - Auscultation
  - Percussion
  - Light Touch
  - Deep Palpation

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## Some keys to the physical exam are:

1. Inform the patient what will transpire -- and why.
2. Assure the patient that any test that causes pain or discomfort will be discontinued.
3. Auscultation should precede ALL other modalities that involve physical contact.
4. Begin contact exam in the area farthest from the site of maximal pain.

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## Physical Examination

### • Methodical Examination

- Inspection
- Auscultation
- Percussion
- Palpation

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Photos obtained from <http://medicine.ucsd.edu/clinicalmed/abdomen.htm>  
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### • Discoloration

- Cullen sign
- Grey Turner Sign
- Jaundice

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### - Scars

- Previous abdominal surgery / trauma

### - Engorged veins

- Obstruction of inferior or superior vena cava

### - Visible pulsations

- Aortic aneurysm
- Mass over aorta

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### • Scaphoid, contracted abdomen

- Early perforated viscus

### • Visible peristalsis & distension

- Mechanical obstruction

### • Soft, doughy distension

- Early ileus

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## Exam Techniques: Auscultation

- **Use Bell of Stethoscope** (low pitched sounds)
  - Peritonitis
  - Obstruction
  - Acute pancreatitis
  - Gastroenteritis
  - Dysentery
  - Active ulcerative colitis
  - Aneurysm

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## Abdominal Pain Complaint: ????

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- 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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## Exam Techniques: Percussion Clues

- Perforated ulcer
- Perforated bowel
- Liver enlargement
- Bowel distention

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## Percussion Clues

- Watch for any muscular guarding
- Should hear either tympany (normal) in supine position or dullness (underlying mass)
- Liver percussion
  - Downward from right midclavicular line – dullness of liver
  - Upward from abdomen – dullness of liver
  - Normal span measurement between 6-12 cm in adult

Obtained April 11, 2010 from <http://medinfo.ufl.edu/year1/fbcs/clist/abdomen.html#AA5>

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## Scratch Test: Liver Auscultation

- 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.

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## Splenic 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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- Spleen percussion
  - Lowest costal interspace in left anterior axillary line – tympany heard
  - Deep breath and percuss again – dullness is splenic enlargement

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- **Fist Percussion Sign**
  - Gentle percussion over anterior wall of chest
    - Sharp pain = acute inflammation
      - Diaphragm & liver
      - Diaphragm & stomach or spleen

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## Abdominal Palpation

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### • Murphy's Sign

- A test for gallbladder disease in which the patient is asked to inhale while the examiner's fingers are hooked under the liver border at the bottom of the rib cage. The inspiration causes the gallbladder to descend onto the fingers, producing pain if the gallbladder is inflamed. Deep inspiration can be very much limited.

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## Aortic Palpation

"Upper abdominal, retroperitoneal structure which is best palpated by applying firm pressure with the flattened fingers of both hands to indent the epigastrium toward the vertebral column."

Note: A well defined, pulsatile mass that is greater than **3cm** across should be evaluated further for an aortic aneurysm.

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Hill, R.D. & Smith, R.B. (1990). Examination of the extremities: Pulses, bruits, and phlebosis. In H.K. Walker, W.D. Hall, & J.W. Hurst (Eds.), *Clinical methods: The history, physical, and laboratory examinations* (pp. 148-152). London: Butterworth Publishers.

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## Additional Palpation Techniques

- **Carnett's Sign**
  - Increased tenderness to palpation of contracted abdomen, i.e., muscular wall
- **Pinch-An-Inch Test**
  - Pinch skin, lift up for 15-20 seconds then release
- **Rovsing's Sign**
  - Palpation of LLQ causes pain in RLQ, i.e., appendicitis
- **Britton's Sign**
  - Cremasteric reflex produced by RLQ pressure in men, i.e., appendicitis

Ortiz, D. D. (2008). Chronic pelvic pain in women. *American Family Physician*, 77(11):1535-1542, 1544. Adams, B.D., Rickett, D., Stuffle, E., & Albaneze, P.A. (2007). The Pinch-an-inch test is more comfortable than rebound tenderness. *The Internet Journal of Surgery*, 12(2).

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### • 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

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

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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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## • Pelvic Exam

– Very important exam for women

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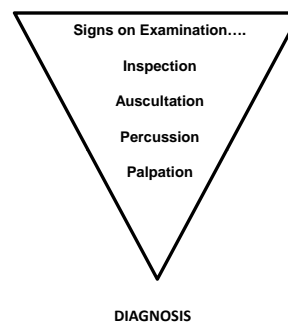
## RED FLAG: Nullipara

- “Early diagnosis and treatment of acute appendicitis are extremely important. A delay in the diagnosis can lead to appendiceal perforation with an increased rate of wound infection and intra-abdominal abscess. In addition, the relative risk of subsequent tubal infertility is increased to about 5 from appendectomy for a ruptured appendix.”

- Morishita, K., Gushimiyagi, M., Hashiguchi, M., Stein, G., & Tokuda, Y. (2007). Clinical prediction rule to distinguish pelvic inflammatory disease from acute appendicitis in women of childbearing age. *American Journal of Emergency Medicine*, 25:152-157.

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## How to determine your diagnosis?



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## Examination Signs

- Aaron Sign = Appendicitis
  - Pain or pressure in epigastrium or anterior chest with persistent firm pressure applied to McBurney point
- Balance's sign = Splenic rupture
  - Dullness to percussion in left flank LUQ & shifting dullness to percussion in the right flank
- Bassler sign = Chronic appendicitis
  - Pinching the appendix between thumb & iliacus muscle causes sharp pain
- Blumberg sign = Peritoneal inflammation
  - Transient abdominal wall rebound tenderness

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- Boas' or Boas's sign = Acute cholecystitis
  - Hyperaesthesia below the right scapula
- Britton's sign = Appendicitis
  - Cremasteric reflex produced by pressure applied to the RLQ
- Carnett's sign = Intra-abdominal source of abdominal pain
  - Loss of abdominal tenderness when abdominal wall muscles are contracted
- Castell's sign = Evaluation of splenomegaly
  - Percussion over Traube's space. If the note changes from resonant on full expiration to dull on full inspiration, the sign is regarded as positive for splenomegaly.

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- Chandelier sign = Pelvic inflammatory disease
  - Movement of cervix causes extreme lower abdomen/pelvic pain
- Charcot's sign = Cholelithiasis
  - Intermittent right upper abdominal pain, jaundice & fever present
- Chilaiditi sign = loop of bowel visible on x-ray between diaphragm and liver (no symptoms)
  - Chilaiditi Syndrome refers to abdominal pain, torsion of the bowel (volvulus) or shortness of breath with Chilaiditi sign present; however, this has nothing to do with Chilaiditi sign since the latter is benign
- Claybrook sign = Ruptured abdominal viscus
  - Accentuation of breath & cardiac sounds through the abdominal wall during auscultation

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- CVA tenderness = Kidney stones
  - Tap over the posterior diaphragm / costal margin
- Cruveihier sign = Portal hypertension
  - Varicose veins (caput medusae) at the umbilicus
- Cullen's sign = Hemoperitoneum
  - Periumbilical bruising
- Dance's sign = Intussusception
  - Retraction of the RLQ
- Danforth sign = Hemoperitoneum
  - Shoulder pain with inspiration

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- Epicritic hyperesthesia = Peritoneal inflammation
  - Skin sensitivity to pin touch
- Fist percussion sign = Acute inflammation
  - Sternum tapped with fist causes pain in upper abdomen, i.e., diaphragm, liver, peritoneum, stomach, or spleen
- Fothergill's sign = Rectus sheath hematoma
  - Flexion of the rectus muscles does not cause a mass in the abdominal wall to change its position
- Grey Turner's sign = Acute hemorrhagic pancreatitis or retroperitoneal bleed
  - Discoloration around the umbilicus and flanks

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- Hannington-Kiff sign = Obturator hernia
  - Absence of adductor reflex in the thigh in the presence of a positive patellar reflex
- Iliopsoas sign = Appendicitis with retrocecal abscess or diverticulitis
  - Elevation and extension of leg against resistance causes pain
- Kehr's sign = Hemoperitoneum from a splenic origin
  - Left shoulder pain when supine & pressure applied to LUQ
- Mannkopf's sign = Evaluation for true abdominal pain
  - Increased pulse occurs with palpation of abdomen creating pain

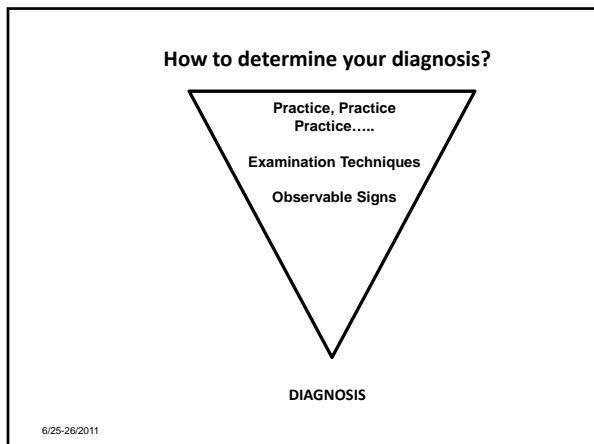
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- Markle sign or jar tenderness = Peritonitis to appendicitis
  - Pain elicited by patient dropping from standing on toes to the heels
- Murphy's sign = cholecystitis
  - Pain caused during inspiration while applying pressure to RUQ
- Obdurator sign = Pelvic abscess, inflammatory mass in the pelvis, appendicitis, diverticulitis
  - Flexion & external rotation of the thigh while supine causes hypogastric pain
- Ransohoff sign = Ruptured common bile duct
  - Yellow discoloration of the umbilical region

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- Rosenstein's sign = Acute appendicitis
  - Increased tenderness to RLQ when moving from a supine position to a recumbent position on the left side
- Rovsing's sign = Acute appendicitis
  - Pain produced at McBurney's point when compressing the LLQ
- Scratch test = Liver enlargement
  - If percussion of liver is difficult, place stethoscope over liver. Working upward lightly scratch the abdomen. Sound becomes more intense over liver.
- Subcutaneous crepitus = Gas gangrene or air under skin
  - Small fluctuant nodules felt with skin during palpation
- Ten Horn sign = Acute appendicitis
  - Pain caused in the right testicle with gentle traction of the testicle

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### Light & Deep Palpation

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### Spleen Percussion

- Lowest costal interspace in left anterior axillary line – tympany heard
- Deep breath and percuss again – dullness is splenic enlargement

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### Fist Percussion Sign

- Gentle percussion over anterior wall of chest
  - Sharp pain = acute inflammation
    - Diaphragm & liver
    - Diaphragm & stomach or spleen

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### Markle Sign (Percussion)

Jar tenderness = heel-drop

i.e., **Peritoneal inflammation, appendicitis, cholecystitis, abscess, acute diverticulitis, abdominal organ infarction**

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### Murphy's Sign (Palpation)

- A test for gallbladder disease in which the patient is asked to inhale while the examiner's fingers are hooked under the liver border at the bottom of the rib cage. The inspiration causes the gallbladder to descend onto the fingers, producing pain if the gallbladder is inflamed. Deep inspiration can be very much limited.

Obtained from Mosby's Medical Dictionary, 8th edition. © 2009, Elsevier

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## Additional Palpation Techniques

- **Carnett's Sign**
  - Loss of abdominal tenderness when abdominal wall muscles tensed - intra-abdominal source of pain
- **Bassler Sign (Pinch-An-Inch Test)**
  - Pinch RLQ skin, lift up for 15-20 seconds then release: ↑ pain - appendicitis
- **Rovsing's Sign**
  - Palpation of LLQ causes pain in RLQ, i.e., appendicitis
- **Britton's Sign**
  - Cremasteric reflex produced by RLQ pressure in men, i.e., appendicitis

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Ortiz, D. D. (2008). Chronic pelvic pain in women. *American Family Physician*, 77(11):1535-1542, 1544. Adams, B.D., Rickett, D., Stuffer, E., & Albaneze, P.A. (2007). The Pinch-an-inch test is more comfortable than rebound tenderness. *The Internet Journal of Surgery*, 12(2).  
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## Additional Palpation Techniques

- **CVA Tenderness**
  - Tapping of posterior diaphragm / CVA region causes internal pain, i.e., kidney stones

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Ortiz, D. D. (2008). Chronic pelvic pain in women. *American Family Physician*, 77(11):1535-1542, 1544. Adams, B.D., Rickett, D., Stuffer, E., & Albaneze, P.A. (2007). The Pinch-an-inch test is more comfortable than rebound tenderness. *The Internet Journal of Surgery*, 12(2).  
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## Additional Exam Techniques:

- **Iliopsoas test**
  - Pain if psoas muscle is inflamed
    - Appendicitis or Diverticulitis
    - Psoas abscess (Left or Right)

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- Patient flexes thigh against examiner's hand resistance

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- **Obdurator Sign**
  - Pain if obdurator internus muscle inflamed
    - Appendicitis
    - Diverticulitis
    - Pelvic inflammatory disease

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- Flexion of patient's right thigh with internal & external rotation

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## Abdominal mass Evaluation

- **Abdominal wall mass**
  - » Remains accessible when patient lifts head
- **Intraabdominal mass**
  - » Moves away

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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
  2. Hold conversation with patient
  3. 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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### • Ticklish patient

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

- One cannot tickle oneself.

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### Parietal versus Visceral Pain

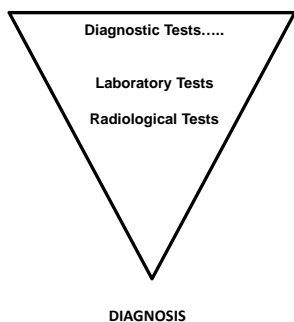
Remember.....

1. If the pain from a given maneuver increases with guarding, the source of the pain is in the abdominal wall.
2. If pain is lessened by guarding, the source is visceral.

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### How to determine your diagnosis?



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### Laboratory & Radiological Testing

Standard Blood & Urine Tests

Standard X-rays  
Contrast X-rays  
Ultrasound  
CT Scans

Panebianco, N.L., Jahnes, K., & Mills, A.M. (2011). Imaging and laboratory testing in acute abdominal pain. *Emergency Medicine Clinics in North America*, 29, 175-193.

***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 too little hand and ear and eye.***

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

### Laboratory Diagnosis of Acute AAA

1. Usually only obtained for pre-op

### Laboratory Diagnosis of Acute Appendicitis

1. WBC
  - Leukocytosis 10,000 – 18,000
2. C-Reactive Protein
  - Elevated
3. Urinalysis
  - ↑ specific gravity, hematuria, pyuria, albuminuria (depends upon where appendix is located)

Wallach, J. (2006). Interpretation of Diagnostic Tests. (8th ed.). Philadelphia: Lippincott Williams & Wilkins.

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### Laboratory Diagnosis of Acute Cholecystitis

1. WBC
  - Leukocytosis 12,000 – 15,000
2. Liver Function Tests
  - ↑'d AST (75% of patients) / ALT
3. Serum Amylase
  - Slight ↑ with gangrene

If there is a common bile stone, then

1. WBC
  - ↑'d
2. Serum & urine bilirubin and amylase
  - ↑'d
3. Alkaline Phosphatase
  - ↑'d

Wallach, J. (2006). Interpretation of Diagnostic Tests. (8th ed.). Philadelphia: Lippincott Williams & Wilkins.

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### Laboratory Diagnosis of Acute Divericulitis

1. WBC
  - Leukocytosis 12,000 – 15,000
2. Liver Function Tests
  - ↑'d AST (75% of patients) / ALT
3. Serum Amylase
  - Slight ↑ with gangrene

If there is a common bile stone, then

1. WBC
  - ↑'d
2. Serum & urine bilirubin and amylase
  - ↑'d
3. Alkaline Phosphatase
  - ↑'d

Wallach, J. (2006). Interpretation of Diagnostic Tests. (8th ed.). Philadelphia: Lippincott Williams & Wilkins.

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### Laboratory Diagnosis of Acute Pancreatitis

1. Serum Amylase (30-110 U/L) / 2 x ULN (>95% sensitivity)
  - ↑ 3-6 hrs, rises rapidly in 8 hrs, with maximum in 20-30 hrs persists 48-72 hrs
2. Serum Lipase (5-208 U/L) / 5 x ULN (specificity 85%)
  - ↑ 3-6 hrs with peak in 24 hrs and returns to normal in 8-14 days
3. Urine Amylase
  - Reflects serum levels by lag of 6-10 hrs.
4. Serum Bilirubin
  - ↑ if pancreatitis caused from biliary tract origin.
5. WBC
  - ↑ slightly between 10,000 to 20,000
6. Serum calcium
  - ↓ in severe cases 1-9 days after onset
7. Hypokalemia, metabolic alkalosis, or lactic acidosis

**Note:** ULN = Upper limits of normal

Wallach, J. (2006). Interpretation of Diagnostic Tests. (8th ed.). Philadelphia: Lippincott Williams & Wilkins.

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- **EKG**
  1. **All patients with h/o heart disease**
  2. **All patients > 50 years of age**
  3. **All patients with possible MI**

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## Radiological Testing

- Chest X-ray
- KUB
- Ultrasound
- CT of Abdomen

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## How to determine your diagnosis?

Other issues needing to be taken into account.....

Medical Causes

Red Flags

**DIAGNOSIS**

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## Medical Causes of Abdominal Pain

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### Extra-abdominal and systemic causes of abdominal pain

Thoracic	Metabolic / Endocrine	Hematologic	Inflammatory	Infectious
Acute Coronary Syndrome	Metabolic Acid Syndromes	Sickle Cell Disease	Familial Mediterranean Fever	Tuberculosis
Pneumonia	Uremia	Ileocecal Syndrome	Eosinophilic Gastroenteritis	Epididymitis
Pulmonary Embolism	Thyrotoxicosis	Acute Leukemia	Polyarteritis Nodosa	Prostatitis
Congestive Heart Failure	Adrenal Insufficiency	Lymphoma	Henoch-Schönlein Purpura	Lyme Disease
Pericarditis	Porphyria		Systemic Lupus Erythematosus	Pneumonia
Mycocarditis	C1 inhibitor Deficiency		Food Allergy	Streptococcal Pharyngitis
	Hypocalcemia / Hypercalcemia		Chronic Angioedema	Pediatric infections
	Pheochromocytoma			

Obtained from Table 1 in: Fields, J.M., & Dean, A.J. (2011). Systemic causes of abdominal pain. *Emergency Medicine Clinics of North America*, 29:195-210.

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## RED FLAGS

### POTENTIAL SURGICAL EMERGENCIES!

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- #### • History

  - Inability to maintain PO intake
  - Projectile vomiting
  - Overt gastrointestinal blood loss
  - Syncope
  - Pregnancy
  - Recent surgery or endoscopic procedure
  - Fever
  - Caustic or foreign body ingestion

#### • Physical Examination

  - Pathologic changes in VS
  - Bloody, maroon, or melanic stool
  - Hernia (incarcerated and tender)
  - Hypoxia
  - Cyanosis
  - Altered mentation
  - Jaundice
  - Peritoneal signs
  - Abdominal pain out of proportion to examination
- Flasar, M.H. & Goldberg, E. (2006). Acute abdominal pain. *The Medical Clinics of North America*, 90, 481-503.
- 6/25-26/2011

- **Laboratory Results**
  - Renal failure
  - Metabolic acidosis
  - Leukocytosis
  - Elevated transaminases
  - Elevated alkaline phosphatase & bilirubin
  - Anemia or polycythemia
  - Hyperlipasemia and/or hyperamylasemia
  - Hyperglycemia or hypoglycemia
- **Radiography**
  - Abdominal free air
  - Gallbladder wall thickening
  - Pericholecystic fluid
  - Dilated biliary tree
  - Bowel obstruction
  - Dilated small bowel loops ± air fluid levels
  - Intra-abdominal abscess
  - Bowel wall thickening
  - Air in the portal venous system
  - Pneumatosis intestinalis

Flisar, 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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**Vomiting before pain....  
Gastroenteritis.**

**Vomiting after pain....  
suggests a surgical  
abdomen!!!!**

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**In general,  
the farther from the  
umbilicus the pain  
localizes,  
the greater the chance  
that a surgical condition  
exists.**

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**THANK YOU!!!**

**BE ALERT FOR AN  
ACUTE ABDOMEN  
AT ALL TIMES**

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**How to determine your diagnosis?**

References.....  
Evidence Based  
Appropriate organizations  
ADA, ACA, AGA, etc.  
Colleagues

DIAGNOSIS

6/25-26/2011

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