Acute Abdomen in Primary Care: Common Surgical Emergencies

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Objectives

- Define acute abdomen.
- Review principles of Diagnosis and Physical Exam for abdominal pathology.
- Apply principle to specific pathology.
- Identify signs and symptoms of specific common abdominal emergencies.
Acute Abdomen: “An abdominal condition of abrupt onset usually associated with abdominal pain due to inflammation, perforation, obstruction, infarction, or rupture of intraabdominal organs. Emergency surgical intervention is usually required.”

Dorland's Illustrated Medical Dictionary, 28th Ed
Acute Abdomen: “symptoms and signs of intra-abdominal disease usually treated best by surgical operation.”

Definitions

- Acute Abdomen: signifies “the need for prompt diagnosis and early treatment, by no means always surgical.”

- “Should never be equated with the invariable need for operation.”

Sir Zachary Cope

1881-1974

1921
Anatomy and Physiology

- Principles of applying knowledge of anatomy and physiology to diagnostic process.
- Peritoneal attachments and visceral sensory innervation
Pain reaches CNS via

- Visceral
- Somatic
- Clinical pain patterns from dual-sensory innervation of the abdominal cavity
Anatomy and Physiology

Visceral pain
- Dull, poorly localized, gradual in onset and longer duration.
- Fibers insensitive to cutting or crushing stimuli
- Usually sensitive to distention of hollow viscus, stretching of capsule of solid viscera (liver hematoma), ischemia, chemicals (acid, etc)
- Usually perceived as midline due to embryological development

Pain from intra-abdominal viscera
Parietal / Somatic pain

- Well localized, more intense
- Stimulated by chemicals, change in pH, bacteria, inflammatory mediators
- Visceral inflammation can irritate peritoneal surface
Example: Appendicitis

- Pain originates as poorly localized in periumbilical region (visceral)
- Progresses to sharply localized right lower quadrant pain as inflammation involves peritoneal surface (parietal)
Referred pain
• Perceived at distant site from stimulus
• Visceral and parietal
  • to dermatomes supplied by the same spinal cord segment as the affected viscus
  • result of afferent neurons that innervate separate distinct anatomy having a common embryologic origin
Referred Pain Regions

- Liver and gallbladder
- Lung and diaphragm
- Heart
- Stomach
- Pancreas
- Ovary (female)
- Colon
- Kidney
- Ureter
- Urinary bladder
- Small intestine
- Appendix
Diagnosis: History

- Pain - Primary focus of complaints
  - Location
  - Distribution
  - Time and Mode of Onset
  - Character
Diagnosis: History

- **Pain: Location - anatomy**
- **Distribution**
  - Referred pain/ radiation
    - Shoulder/scapula - biliary pathology, abscess or blood under diaphragm
    - Groin - ipsilateral renal stones
  - Migration/ shifting
    - Appendicitis
    - Perforated duodenal ulcer - leaking contents
Pain: Time and Duration

- Time of onset
- Intense pain more than 6 hours usually significant
- Circumstances
  - Postprandial
  - Awaken from sleep
  - During exertion
  - After injury
Diagnosis: History

- Pain: Mode of Onset
  - Sudden
    - Perforated viscus, acute intestinal ischemia
  - Gradual
    - Cholecystitis
    - Acute Pancreatitis
  - Intermittent
    - Diverticulitis
    - Peptic ulcer
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Pain: Character

- Quality
  - Sharp
    - Perforated peptic ulcer
  - Dull
    - Small bowel obstruction
  - Colicky
    - Crampy, intermittent
  - Burning
    - Pancreatitis
- Severity
  - Ureteral obstruction
Vomiting

- GI tract irritated or overdistended.
- Impulses transmitted by sympathetic and vagal fibers to vomiting center in medulla oblongata.
- Motor pulses transmitted to diaphragm and abdominal muscles through phrenic and spinal nerves.
- Pain of any origin can be associated with N/V.

Vomiting

- Irritation of nerves of peritoneum or mesentery
  - Acute pancreatitis and celiac plexus
- Obstruction of involuntary muscular tube
  - Antiperistalsis from obstruction
  - Stretching of muscle fibers and colic pain
  - Intestinal obstruction, renal colic
Diagnosis: History

- Vomiting
  - Relationship of vomiting to pain
  - Intestinal obstruction
    - Length of interval before onset may indicate location of obstruction
  - Appendicitis
    - Pain almost always precedes vomiting by several hours
**Vomiting: Character**

- **Upper GI tract bleeding**
  - Bloody or coffee ground
- **Acute Gastritis**
  - Stomach contents, some bile
- **Intestinal obstruction**
  - Gastric contents > bilious > yellow > feculent
  - Feculent vomiting indicative of distal small bowel
  - Rare in colon obstruction
Bowel Function

- Diarrhea
  - Chronic or acute
- Constipation
- Obstipation
- Hematochezia, melena
Diagnosis: History

- **Past History**
  - Recent illness
  - Recent operation
  - Past operations
    - Change differential diagnosis
  - Comorbid conditions
Diagnosis: Examination

- Appearance of patient
  - Facial expression
- Attitude in bed
- Ability to communicate
- Signs of pain
- Habitus
Diagnosis: Examination

- Vital signs
  - Low Fever
    - Appendicitis, cholecystitis
  - High Fever
    - Pneumonia, UTI, gynecologic infection
  - Pulse
    - Usually normal until advanced disease
  - Hypotension, Tachycardia
    - Advanced peritonitis
Diagnosis: Examination

- Abdominal examination
  - Where pain started
  - Migration of pain
  - Point of maximal pain
Diagnosis: Examination

- Inspection of abdomen
  - Contour
    - Scaphoid, flat or distended
  - Scars
  - Hernias – may be difficult in obese
    - Groin
    - Umbilicus
    - Incisions
Auscultation of abdomen
- Presence or absence of bowel sounds
- Quiet
  - ileus
- Intermittent high-pitched hyperactive
  - Small bowel obstruction
- Rarely to auscultation findings alone indicate or contraindicate an operation.

Diagnosis: Examination

- Palpation of abdomen
  - Assess facial expression
  - Start away from pain site
  - Note location and extent of tenderness
  - Determine masses or swelling
Diagnosis: Examination

- **Guarding**
  - Increased muscle tone during exam.
  - Press slowly and firmly on abdomen.
  - Detect muscle spasm.
Diagnosis: Examination

- Guarding
  - Voluntary
    - Abdominal muscles relax when patient asked to relax
  - Involuntary
    - Abdominal muscles remain tense
    - Underlying peritonitis
    - Ex: board-like rigid abdomen of perforated ulcer
Rebound tenderness

- Indicates peritonitis
- Press deep into abdomen, sudden withdrawal cause increase in pain
- Percussion can also demonstrate rebound tenderness
Percussion

- Can assess for rebound tenderness
- Extent of gut distention
  - Hyper-resonance or tympany
  - Gaseous distention of intestine or stomach
- Dullness of liver
  - Resonance over liver may indicate free intraperitoneal gas
Rectal exam
- Lower pelvis can be assessed
- Prostate, uterus, bladder, appendix
- Rectal obstruction
  - Impaction
  - Tumor
- Gross blood, pus
Pelvic exam
- Bimanual
  - Tenderness
  - Uterine or adnexal masses
- Speculum exam
  - Cervix discharge
- Ovarian torsion
- Acute salpingitis
- Ectopic pregnancy
Diagnosis: Laboratory

- History and physical prior to ordering labs
- Excessive reliance may lead physician astray prior to examination
- Help identify underlying chronic disease
- Guide resuscitation perioperatively
- CBC, Chemistry, Liver enzymes, Amylase, Lipase, pregnancy testing, EKG

Advancements and availability has improved accuracy and management.

Plain films: CXR, Abdomen

US

CT- accurate in many disease processes

GI Contrast studies- perforation, obstruction

MRI- not much role in acute abdomen
Pathology

- Biliary colic
- Perforated gastric ulcer
- Perforated duodenal ulcer
- Acute pancreatitis
- Acute intestinal obstruction
- Meckel's diverticulum
- Acute perforative appendicitis
- Acute diverticulitis
- Ruptured ovarian cyst
- Torsion of ovary
- Acute salpingitis
- Ectopic pregnancy
Appendicitis

- Most common acute surgical abdomen
- Most frequent in 2nd and 3rd decades
- Male predominance
- Faster progression in younger population
- Deceptively mild with increased morbidity in elderly

Pathogenesis

- Obstruction of lumen
  - Fecalith
  - Lymphoid hypertrophy
  - Foreign body
- Overgrowth resident bacteria
- Continued mucosal secretion

Pathogenesis

- Distention, increased intraluminal pressure
- Vascular congestion
  - Edema
  - Ischemia
- Translocation of bacterial through ischemic wall
- Perforation

Clinical Considerations

- History prior to onset of pain
- Symptoms of attack and local signs
- Order of occurrence of symptoms

Diagnosis

- Indigestion
- Flatulence
- Irregularity of bowels
  - Constipation
  - Occasionally diarrhea
Pain

- Initially vague epigastric or periumbilical
  - Referred pain
  - Visceral
- Localizes to right iliac region
  - Several hours
  - Rebound at McBurney’s point (1/3 the distance from the anterosuperior iliac spine to the umbilicus)
  - Exact location varies based on anatomic location of appendix
Rovsing’s sign
- Pain in the right lower quadrant with palpation of the left lower quadrant

Psoas sign
- Extension of right thigh while lying on left side
- Inflamed appendix overlying psoas muscle

Obturator sign
- Passive internal rotation of flexed right thigh while supine
Positional movement causes pain.
Comfort in fetal position or supine with legs drawn up.
Hyperesthesia
  • Localized in right
  • Distribution of spinal nerves T10,11,12
Anorexia
  - Frequent
  - Hunger should raise a question of the diagnosis

Nausea, emesis
  - Emesis more common in children
  - Few hours after initial pain
  - Vomiting before onset of pain should raise suspicion of the diagnosis

Fever
- Mildly elevated
- Higher if perforated
- If considerably high at onset of symptoms (103°F or 104°F), suspect other diagnoses

Heart rate
- Rarely elevated
- May accelerate with continue peritonitis or perforation
Sequence of symptoms

- Pain - epigastric or umbilical
- Anorexia, nausea or vomiting
- Tenderness - lower abdomen or pelvis
- Fever
- Leukocytosis
Diagnosis

- **Perforation**
  - From gangrene of wall
- **Presence of abscess means perforation**
- **Same symptoms + local or diffuse peritonitis**
- **Usually does not occur until after 48 hours from the onset of symptoms**

CBC
- Leukocytosis - may not be present in early disease

U/A
- May show mild pyuria
Radiograph

- **Ultrasound**
  - Operator-dependent
  - Sensitivity > 85%
  - Specificity > 90%
  - May not visualize if retrocecal or if cecum is gas-filled.

CT- use increased significantly
- Increasing accuracy
- Sensitivity 90-100%
- Specificity 91-99%
- Studies claim to reduce negative appendectomy rates

CT- appendicitis

- Thickened appendix, >5-7mm diameter
- "halo" sign - circumferential wall thickening
- Mesenteric inflammation
- Appendicolith

Birnbaum. Appendicitis at the Millenium. May 2000
Radiology, 215, 337-348
Men

- Diverticulitis
- Bowel obstruction
- Ureteral stone
- Gastroenteritis
Differential

Women

- Salpingitis
- Ectopic pregnancy
- Ovarian torsion
- Ruptured ovarian cyst
- Uterine colic
- Rupture of endometrioma
Appendicitis in pregnancy

- Location of appendix shifts above pelvis from gravid uterus
- WBC, n/v, anorexia not helpful
- Ultrasound
- MRI
- Early intervention in all trimesters
Appendicitis in pregnancy

- Low risk fetal loss in negative appendectomy
- High incidence of fetal death with delay in diagnosis and perforation
- Laparoscopy safe
Treatment

- **Urgent appendectomy**
  - Acute, uncomplicated appendicitis
- **IV fluid resuscitation**
- **Preop antibiotics**
- **Surgery**
  - Open approach
  - Laparoscopic
Laparoscopic appendectomy

- Becoming standard
- Shorter hospital stay
Laparoscopic appendectomy

- Faster recovery
- Smaller incisions
  - Lower infection rates
  - Lower hernia rates

Cholecystitis

Carl Langenbuch
Gallstone disease
- Common indication for surgery

Acute cholecystitis
- Inflammation of gallbladder
- Obstruction of cystic duct
  - Gallstones
  - Sludge

Chronic cholecystitis

- Symptomatic gallstones
- "Biliary colic"
- Obstruction of cystic duct
  - Increase tension in gallbladder wall
- Right upper quadrant pain
- Midepigastric pain
- Radiates to back

Chronic cholecystitis

- Usually after greasy meal
  - More than one hour post-prandial
- Duration 1-5 hours
- Nausea, vomiting, bloating
Chronic cholecystitis

- Exam: usually normal
  - Mild right upper quadrant tenderness during episode
- Ultrasound: 95-98% sensitivity
- Treated with elective laparoscopic cholecystectomy

Elsevier, 2004
Acute Cholecystitis

- Cystic duct remains obstructed
- Gallbladder distention
- Wall inflammation and edema
- Can lead to ischemia and necrosis
Acute cholecystitis

- Right upper quadrant pain
- Longer duration (days vs hours)
- Nausea, vomiting, fever
- Focal tenderness, guarding in RUQ
- Murphy's sign
  - Inspiratory arrest with deep palpation in right upper quadrant
Acute Cholecystitis

- Mild leukocytosis
- Mild elevation of liver enzymes
- Ultrasound
  - Stones
  - Wall thickening >4mm
  - Pericholecystic fluid
  - Sonographic Murphy’s sign
- HIDA
  - Useful for atypical cases
Hepatitis
Myocardial infarction
Appendicitis, ascending or retrocecal
Peptic ulcer
Acute cholecystitis

- **Treatment**
- **IV antibiotics**
- **Limited oral intake**
- **Cholecystectomy**
  - Should be attempted within 24-48 hours
Cholecystectomy

- Laparoscopic approach preferred
- Lower morbidity
- Faster recovery
Biliary Dyskinesia

- Biliary colic without gallstones
- HIDA with CCK
  - Hepatobiliary Iminodiacetic Acid
  - CCK infused after gallbladder filled with Technetium labeled radionuclide
- Ejection Fraction less than 35% is abnormal
- Elective laparoscopic cholecystectomy
Cholangitis

- Obstructed CBD
- Jaundice
- Fever
- Right upper quadrant pain
- Pale stools
- Dark urine
- ERCP to relieve obstruction and drain duct
Intestinal obstruction
Intestinal obstruction

- Adhesions
- Hernia
- Cancer
Intestinal obstruction

- Pain
- Vomiting
- Constipation
  - passage of stool does not rule out complete obstruction
- Obstipation
- Distention-fluid sequestration, gas
- Shock- fluid losses
Proximal Small Bowel Obstruction

- Duodenum, jejunum
- More acute, greater pain
- Early vomiting
  - Bilious, not feculent
- Limited distention
- Volume deficits may be large
Distal Small Bowel Obstruction

- Pain less severe
- Later onset of emesis
  - May be feculent later in course
- Abdominal distention
- Volume deficits - late
Colon Obstruction

- Pain less acute
- Vomiting late and rare
- Significant distention early
  - Closed loop between obstruction and ileocecal valve
- Cancer
- Diverticulitis
- Volvulus
Strangulated Bowel

- Acute onset of symptoms
- Complete bowel obstruction
  - Adhesive bands
  - External or Internal Hernia
- Compression of mesentery
  - Occlusion of vessels
  - Bowel gangrene, perforation
  - Peritonitis
Extent of Obstruction

- Degree of luminal occlusion
- Symptoms less severe if partial obstruction
- Adhesions
- Stricture
- May resolve spontaneously or conservative management
Plain abdominal x-rays

- Flat and upright
- Distended loops
- Step ladder pattern
CT - more definitive imaging
- Strangulation
- Ischemia
- Tumor

Small Bowel Series/Enteroclysis
- Barium or gastrografin
Diverticulitis
Pseudodiverticula

- Mucosal herniation devoid of muscular layer
- Entry points of arterioles
- Sigmoid colon most common site
Diverticulosis
Diverticulitis

- Perforation of diverticulum
- Obstruction and bacterial overgrowth
- Pericolonic infection
  - Exposure of pericolonic tissue to intraluminal contents
- Body’s ability to wall off and control infection = severity of disease
Hinchevy classification

- I. Pericolic or mesenteric abscess
- II. Walled-off pelvic abscess
- III. Generalized purulent peritonitis
- IV. Generalized fecal peritonitis

Symptoms

- Left lower quadrant pain
  - Radiate to suprapubic, groin, and back
- Altered bowel function
- Fever
- Urinary complaints
  - Pneumaturia = colovesical fistula
Exam

- Severity of disease
- Location
- Left lower quadrant tenderness
- Guarding
- Rectal- tender mass if pelvis abscess
- Assess for diffuse peritonitis
  - Free rupture with feculent peritonitis
CT- preferred imaging

- Identify severity of disease
- Complicated disease: abscess, fistula, obstruction
- Rule other other etiology (cancer, appendicitis)

Treatment

- Less than 10% require emergent surgical intervention
  - Advancements in antibiotics, imaging, and interventional radiology
- Broad spectrum antimicrobial therapy
  - Include anaerobic coverage
  - Fluoroquinolone and metronidazole
  - Total 7-10 days

Treatment

- Can treat as outpatient if mild and able to tolerate oral intake
  - Low residue diet
- Hospitalization and IV antibiotics
  - Severe disease
- Surgical consultation
- Interventional Radiology
  - Abscess drainage
Emergent surgery
  - Diffuse peritonitis, free rupture
  - Failure to improve with antibiotics

Colon resection
  - Hartmann’s colostomy common
Elective colectomy

- Recurrence 10-30% rate within decade after first episode
- Increased risk of emergent surgery with each hospitalization
  - Abscess
- Uncertainty regarding when elective surgery is warranted

Perforated Peptic Ulcer

- Chronic history of indigestion
- History of excessive aspirin or NSAID use
  - Chronic pain
- Sudden onset of pain
Early symptoms

- Spillage of gastric contents
- Sudden agonizing pain
- Epigastric, extends to remainder of abdomen
- Vomiting

Intermediate symptoms

- Less severe pain
- Vomiting subsides
- Pain on movement
- Abdominal wall rigid, flat
  - Peritonitis
- Resonance over liver
  - Free peritoneal gas

Late symptoms

- Distended abdomen
  - Progressing peritonitis
- Abdomen less rigid
- Vomiting
- Fever
- Shock

Plain and upright abdominal xray
Imaging

- CT
- Gastrografin study
  - May show that ulcer has sealed
Treatment

- Early Surgical consultation
- Surgical repair
  - Omental / Graham patch
- Open or laparoscopic
Minimally invasive techniques utilized more frequently in emergencies

- Laparoscopic appendectomy
- Laparoscopic cholecystectomy
Advancements in Surgery

- Single Incision Laparoscopy
- Robotic Surgery
Conclusion

- Prompt diagnosis through thorough history and physical
- Early Surgical consultation
  - When in doubt, communicate with Surgeon