Chapter 24 - Abdominal Pain

EPISODE CONTENT BASED ON ROSEN'S EMERGENCY MEDICINE (9TH ED.)

Italicized text is quoted directly from Rosen's.

Key Concepts:

1. Certain patients: with abdominal pain, including elderly patients, women of reproductive age, immunocompromised, patients with cancer, and those who have undergone surgery (esp bariatric surgery) are more likely to harbour serious pathology
2. Early POCUS is indicated for patients with signs of shock. US may identify AAA or free intraperitoneal blood.
3. The WBC count is non-diagnostic in the evaluation of patients with abdominal pain!
4. US is superior to CT scanning for the evaluation of pain originating in the biliary tract or pelvis. Most abdominal pain can be diagnosed with non-contrast or IV only contrast only CT scan.
5. Plain radiographs are rarely useful, and should be obtained in rapid detection of free air or obstruction, when there is no intent to proceed to CT should the radiograph be positive or negative…
6. Pain medication does not impede diagnosis of abdominal pain!
7. Close to half of all patients with abdo pain in the ED will not get a definitive diagnosis.
8. First line abx for severe intraperitoneal infections should be broad spectrum, including anaerobic coverage, such as Tazocin or Cipro/Flagyl.

Rosen's in Perspective

Alright, everyone. It is time for yet another cruise down Rosen's lane. Today, we are covering one of the most important chapters that review core EM content - Chapter 24 - Abdominal Pain. While the chapter itself is not as exciting as others, it no doubt provides you with the information you need to skillfully navigate your next patient encounter with someone complaining of the ol' angry gut syndrome.

Abdominal pain, as many of you well know, is one of the most common presenting complaints for patients in the ED. And while individuals often come looking for answers, many (approximately 40%) will never have a definitive pathology identified. While it may be easy to falsely conflate this relatively high number of unsolved medical mysteries with notions that abdominal pain is not a serious complaint, do not fall into that trap. Those achy innards often fool ED clinicians, so it is best to approach each case systematically. Today's episode will review the extensive differential for this complaint, detail the risk factors that increase the likelihood of a patient harbouring a sinister pathology, explain common pitfalls that should be avoided when investigating patients with abdominal pain, and present an approach to the acute

stabilization and management for this patient population. It may sound like a lot, but we will make sure your journey with us today is as helpful as possible - so sit back, turn up the volume and enjoy the ride!

Core Questions

1. What are risk factors for serious underlying causes of abdominal pain? (Box 24.1)
2. Explain key symptoms and signs to look for in the evaluation of the patient with abdominal pain.
3. What diagnoses are associated with different patterns of abdominal pain? (Fig 24.1)
4. List 5 critical and 5 emergent causes of abdominal pain. (Table 24.1, 24.2)
5. Explain an approach to ancillary testing in abdominal pain.
6. Outline a diagnostic algorithm for patients with abdominal pain. (Fig 24.4)
7. Outline an empiric management algorithm for abdominal pain. (Fig 24.5)

Wisecracks

1. What are the structures included in the foregut, midgut, and hindgut? More importantly, why do you care?
2. List indications for bedside US in the ED patient with abdominal pain (Table 24.3)
3. Explain how referred pain works in the setting of abdominal pain (Fig 24.2)

Core Questions:

[1] What are risk factors for serious underlying causes of abdominal pain? (Box 24.1)

This table was adapted from Box 24.1 in Rosen's 9th Edition. Please see the textbook for the accompanying images.

Patients with abdominal pain at higher risk for serious underlying disorders:
-age >60
-previous abdominal surgery, including bariatric surgery
-history of IBD
-recent instrumentation ex. Colonoscopy with biopsy
-known malignancy
-active chemotherapy
-immunocompromised, including low dose steroids
-fevers, chill, or systemic symptoms
-women of childbearing age
-recent immigrants
-language or cognitive barriers

[2] Explain key symptoms and signs to look for in the evaluation of the patient with abdominal pain.

Ask about onset, location, radiation, timing, triggers etc. Plus fevers, urinary symptoms, N/V or hematemesis, bowel habit/bloody stools and LMP/pregnancy status/sexual history in females. Some classic descriptions are as follows:

1. Diffuse, severe pain and severe nausea in bowel obstruction
2. Pain "out of proportion" in mesenteric ischemia
3. Radiation from epigastrium to midback accompanied by severe N/V in pancreatitis
4. Radiation to left shoulder with splenic pathology, diaphragmatic irritation, or free fluid
5. Onset of pain with syncope in ruptured AAA or ectopic

[3] What diagnoses are associated with different regions of abdominal pain? (Fig 24.1)

This table was adapted from figure 24.1 in Rosen's 9th Edition. Please see the textbook for the accompanying images.

Differential of acute abdominal pain based on location:

Location of pain	Diagnoses
Diffuse	Peritonitis, pancreatitis, sickle cell crisis, early appendicitis, mesenteric thrombosis, gastroenteritis. Dissecting of ruptured aneurysm, intestinal obstruction, diabetes mellitus, inflammatory bowel disease, IBS
Right upper quadrant	Biliary colic, cholecystitis, gastritis, GERD, hepatic abscess, acute hepatitis, hepatomegaly due to CHF, perforated ulcer, pancreatitis, retrocecal appendicitis. myocardial ischemia, appendicitis in pregnancy, RLL pneumonia
Left upper quadrant	Gastritis. Pancreatitis, GERD, splenic pathology, myocardial ischemia, pericarditis, myocarditis, LLL pneumonia, pleural effusion
Right lower quadrant	Appendicitis, meckel's diverticulitis, cecal diverticulitis. Aortic aneurysm, ectopic pregnancy (PID), ovarian cyst, pelvic inflammatory disease, endometriosis, ureteric calculi, psoas abscess, mesenteric adenitis, incarcerated/strangulated hernia, ovarian torsion, tubo-ovarian abscess, urinary tract infection
Left lower quadrant	Aortic aneurysm, sigmoid diverticulitis, incarcerated/strangulated hernia, ectopic pregnancy, ovarian torsion, mittelschmerz,

			ovarian cyst, PID, endometriosis, endometriosis, tubo-ovarian abscess, ureteric calculus, psoas abscess, urinary tract infection

[4] List 5 critical and 5 emergent causes of abdominal pain (Table 24.1, 24.2)

Adapted from Table 24.1: Critical Causes of Abdominal Pain in Rosen's 9th Edition

Cause	Epidemiology	Etiology	Presentation	Physical Exam	Useful Tool(s)
Ruptured ectopic pregnancy	Occurs in females of childbearing age. No method of contraception prevents ectopic pregnancy. Approximately 1 in every 100 pregnancies.	Risk factors include nonwhite race, older age, history of STD or PID, infertility treatment, intrauterine contraceptive device placed within the past year, tubal sterilization, and previous ectopic pregnancy.	Severe, sharp constant pain localized to the affected side. More diffuse abdominal pain with intraperitoneal hemorrhage. Signs of shock may be present. Midline pain tends not to be ectopic pregnancy.	Shock or evidence of peritonitis may be present. Lateralized abdominal tenderness. Localized adnexal tenderness or cervical motion tenderness increases the likelihood of ectopic pregnancy. Vaginal bleeding does not have to be present.	β-hCG testing is necessary in all females of childbearing age (10 to 55 years old); combined with ultrasonography, preferably transvaginal in early pregnancy, usually is diagnostic. FAST examination is useful in evaluating for free fluid in patients with shock or peritonitis.
Ruptured or leaking abdominal aneurysm	Incidence increases with advancing age. More frequent in men. Risk factors include HTN, DM, smoking, COPD, and CAD.	Exact cause is undetermined. Contributing factors include atherosclerosis, genetic predisposition, HTN, connective tissue disease, trauma, and infection.	Patient is often asymptomatic until rupture. Acute epigastric and back pain is often associated with or followed by syncope or signs of shock. Pain may radiate to back, groin, or testes.	Vital signs may be normal (in 70%) to severely abnormal. Palpation of a pulsatile mass is usually possible in aneurysms 5 cm or greater. The physical examination may be nonspecific. Bruits or inequality of femoral pulses may be evident.	Abdominal plain films are abnormal in 80% of cases. Ultrasound can define diameter and length but can be limited by obesity and bowel gas. FAST examination can be helpful in evaluating for leak by looking for free fluid. Spiral CT test of choice in stable patients.

Mesenteric ischemia	Occurs most commonly in elders with CV disease, CHF, cardiac dysrhythmias, DM, sepsis, and dehydration. Mortality is 70%. Mesenteric venous thrombosis is associated with hypercoagulable states, hematologic inflammation, and trauma.	20% to 30% of lesions are nonocclusive. The causes of ischemia are multifactorial, including transient hypotension in the presence of preexisting atherosclerotic lesion. The arterial occlusive causes (65%) are secondary to emboli (75%) or acute arterial thrombosis (25%).	Pain can be severe and colicky starting in the periumbilical region and then becomes diffuse. Often associated with vomiting and diarrhea. Sometimes postprandial ie, "mesenteric or abdominal angina."	Early examination results can be remarkably benign in the presence of severe ischemia. Bowel sounds are often still present. Rectal examination is useful because mild bleeding with positive guaiac stools can be present.	Often a pronounced leukocytosis is present. Elevations of amylase and creatine kinase levels are seen. Metabolic acidosis caused by lactic acidemia is often seen with infarction. Plain radiographs are of limited benefit. CT, MRI, and angiography are accurate to varying degrees.
Intestinal obstruction	Peaks in infancy and in the elderly. More common with history of previous abdominal surgery.	Adhesions, carcinoma, hernias, abscesses, volvulus, and infarction. Obstruction leads to vomiting, "third spacing" of fluid, or strangulation and necrosis of bowel.	Crampy diffuse abdominal pain associated with vomiting.	Vital signs are usually normal unless dehydration or bowel strangulation has occurred. Abdominal distention, hyperactive bowel sounds, and diffuse tenderness. Local peritoneal signs indicate strangulation.	Elevated WBC count suggests strangulation. Electrolytes may be abnormal if associated with vomiting or prolonged symptoms. Abdominal radiographs and CT are useful in diagnosis.
Perforated viscus	Incidence increases with advancing age. History of peptic ulcer disease or diverticular disease common.	More often a duodenal ulcer that erodes through the serosa. Colonic diverticula, large bowel, and gallbladder perforations are rare. Spillage of bowel contents causes peritonitis.	Acute onset of epigastric pain is common. Vomiting in 50%. Fever may develop later. Pain may localize with omental walling off of peritonitis. Shock may be present with bleeding or sepsis.	Fever, usually of low grade, is common; worsens over time. Tachycardia is common. Abdominal examination reveals diffuse guarding and rebound. "Board-like" abdomen in later stages. Bowel sounds are decreased.	WBC count is usually elevated owing to peritonitis. Amylase may be elevated; LFT results are variable. The upright radiographic view reveals free air in 70% to 80% of cases with perforated ulcers.

Massive gastrointestinal bleeding	More common in older adults ages 40 to 70.	History of peptic ulcer disease, gastritis, or liver disease; prior GI bleeding history. Not typically caused by Mallory-Weiss tears, which typically can occur in the stomach but rarely cause severe bleeding.	Nausea and vomiting typically occur with upper GI bleeds with hallmark coffee-ground or hematemesis; lower GI bleeds associated with poorly localized discomfort and bright red blood per rectum; slow transit can lead to melena.	Non-focal abdominal tenderness; large bleeds may result in tachycardia and hypotension with enough blood loss. Hemoglobin/hematocrit is rarely abnormal in acute, massive bleeds.	Stool or gastric guaiac if there is a question of bleeding; massive bleeds may require emergent consultation by gastroenterology or surgery to intervene.
Acute pancreatitis	Peak age is adulthood; rare in children and elders. Male preponderance Alcohol use and biliary tract disease are risk factors.	Alcohol, gallstones, increased lipids, hypercalcemia or endoscopic retrograde pancreatography causing pancreatic damage, saponification and necrosis. ARDS, sepsis, hemorrhage, and renal failure are secondary.	Acute onset of epigastric pain radiating to the mid-back. Nausea and vomiting are common. Pain disproportionate to physical findings. Adequate volume repletion is important in the initial therapy.	Low-grade fever is common. Patient may be hypotensive or tachypneic. Some epigastric tenderness is usually present. Because pancreas is retroperitoneal organ, guarding or rebound not present unless condition is severe. Flank ecchymosis or periumbilical ecchymosis may be seen if process is hemorrhagic.	Serum lipase is the test of choice. Ultrasound examination may show edema, pseudocyst, or biliary tract disease. CT scan may show abscesses, necrosis, hemorrhage, or pseudocysts. Ultrasound is recommended to assess for gallstones while CT is recommended if severe acute pancreatitis is suspected.

Adapted from Table 24.2: Emergent Causes of Abdominal Pain in Rosen's 9th Edition

Causative disorder or condition	Epidemiology	Etiology	Presentation	Physical Exam	Useful Test (s)
Gastric, esophageal or duodenal inflammation	Occurs in all age group.	Caused by gastric hypersecretion, breakdown of mucoprotective barriers, infection, or exogenous sources	Pain is epigastric, radiating or localized, associated with certain foods. Pain may be burning in some cases exacerbation in supine position	Epigastric tenderness without rebound or guarding. Perforation or bleeding leads to more severe clinical findings.	Uncomplicated cases are treated with antacids or histamine H2 blockers before invasive studies are contemplated. Gastroduodenoscopy is valuable in diagnosis and biopsy. Testing for Helicobacter pylori with blood or biopsy specimens. If perforation is suspected , an upright chest

|					radiograph is obtained early to rule out free air. CT may be beneficial.
Acute appendicitis	Peak age In adolescence and young adulthood; less common in children and elders. Higher perforation rate in children, elderly and women (especially in pregnancy).Mortality rate is 0.1% but increases to 2 to 6% with perforation	Appendiceal lumen obstruction leads to swelling, ischemia, infection and perforation	Epigastric or periumbilical pain migrates to RLQ over 8 to 12 hours (50% to 60%). Later presentations associated with higher perforation rates. Pain, low grade fever, and anorexia common	Higher temperature associated with perforation. RLQ tenderness with rebound in the majority of cases.	
Biliary tract disease	Peake age 35-60. Unlikely in patient younger than 20. Female to make ratio 3:1. Risk factors include multiparity, obesity, alcohol intake, and OCP	Passage of gallstones causes biliary colic. Impaction of a stone in the cystic duct or CBD leads to cholecystitis or cholangitis.	Crampy RUQ pain radiates to the right subscapular area. Prior history of pain is common. May have N/V or postprandial pain. Longer duration of pain favors diagnosis of cholecystitis or cholangitis.	Temperature is normal in biliary colic, elevated in cholecystitis, and cholangitis. RUQ tenderness, rebound and jaundice may be present.	WBC is elevated in cholecystitis and cholangitis. Lipase and LFTs may help differentiate this from gastritis or ulcer disease. US shows wall thickening, pericholecystic fluid, stones, or duct dilatation. Hepatobiliary scintigraphy diagnoses gallbladder dysfunction.
Ureteral colic	Average age for first episode is 30-40 years old. Prior history of stones is common.	Family history, gout, proteus infection. Renal tubular acidosis and cystinuria lead to stone formation.	Acute onset of flank pain radiating to groin. Nausea, vomiting, and pallor common. Patients are usually writhing in pain.	Vital signs are usually normal. Tenderness on CVA percussion with benign abdominal exam.	Urinalysis shows hematuria. Non-contrast CT is sensitive and specific. US with fluid bolus useful diagnostically.
Diverticulitis	Incidence increases with advancing age, affects males more than females. Recurrences are common.	Colonic diverticula may become infected or perforated or cause a local colitis. Obstruction, peritonitis, abscesses, fistulae result from infection or swelling.	Change in stool frequency or consistency commonly reported. LLQ pain is common. Associated with fever, N/V, rectal bleeding may be seen.	Fever Usually of low grade. LLQ pain without rebound is common. Stool may be heme positive.	Results on most tests usually normal. Plain radiographs not indicated. CT is diagnostic, but diagnosis is often made clinically.
Acute gastroenteritis	Seasonal. Most common misdiagnosis of appendicitis. May be seen in multiple family members. History of travel or immunocompromise. Most common GI disease in the United States.	Usually viral. Consider invasive bacterial or parasitic cause in prolonged cases, in travelers or immunocompromised patients.	Pain usually poorly localized, intermittent, crampy, and diffuse. Diarrhea is key element in diagnosis; usually large volume, watery. N/V usually begin before pain.	Abdominal examination usually non-specific without peritoneal signs. Watery diarrhea or no stool noted on rectal examination. Fever is usually present.	Usually symptomatic care with antiemetics and volume repletion. Hem e-positive stools may be a clue to invasive pathogens. Key is not using this as a default diagnosis and missing more serious disease.
Constipation and obstipation	More common in females, elderly, the very young, and patient on narcotics.	Idiopathic or hypokinesis secondary to disease states (low motility) or exogenous	Abdominal pain and change in bowel habits.	Variable. Non-specific without peritoneal signs. Rectal examination	Radiographs may show large amounts of stool. This is a diagnosis of exclusion.

		sources (diet, medications).		may reveal hard stools or impaction.	

[5] Explain an approach to ancillary testing in abdominal pain.

Labs - UA and BHCG among highest yield tests
CBC - WBC is nonspecific
Lipase, Liver enzymes, and coags - helpful in small proportion
X-ray - free air or obstruction
US - biliary or pelvic pathology
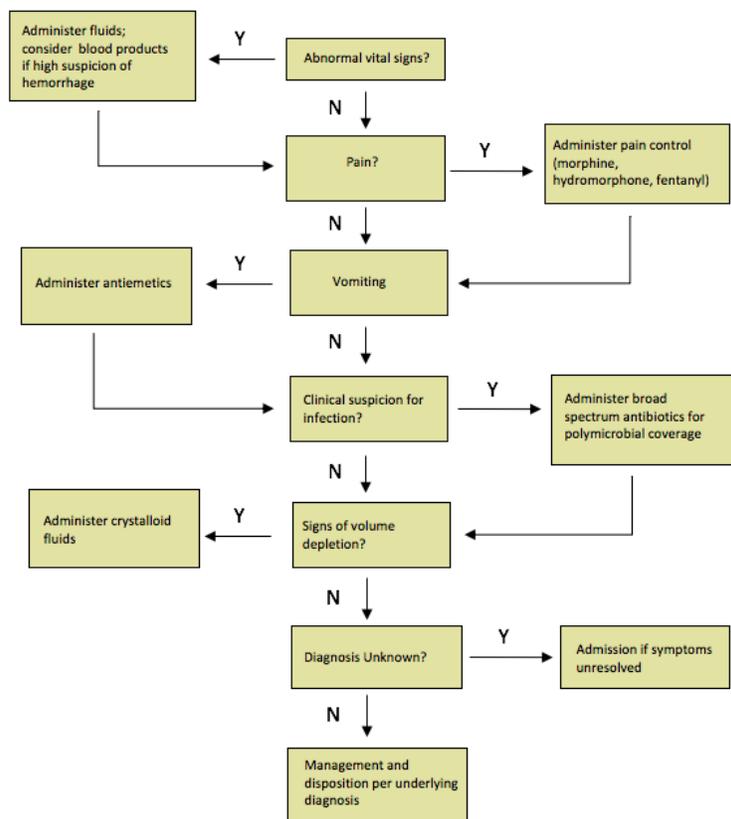CT - pretty much everything else
Endoscopy - GI bleeds or ?PUD, ?IBD

[6] Outline a diagnostic algorithm for patients with abdominal pain (Fig 24.4).

Adapted from Fig 24.4 in Rosen's 9th edition
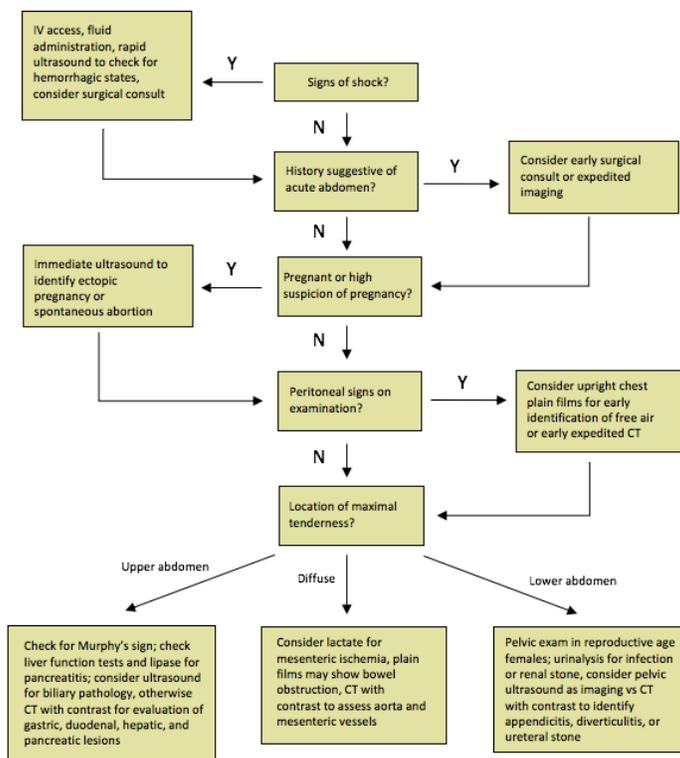
[7] Outline a management algorithm for patients with abdominal pain. (Fig 24.4)

Adapted from Figure 24.4 in Rosen's 9th edition

Remember to resuscitate and provide analgesia quickly when it is indicated! Don't spend a bunch of time on your H&P before looking after your patients immediate needs.

Wisecracks:

[1] What are the structures included in the foregut, midgut, and hindgut? More importantly, why do you care?

Visceral pain is perceived from the abdominal region that corresponds with the embryonic somatic segment.
1. Foregut: stomach, duodenum, liver, GB, pancreas = Epigastric abdominal pain (T7-T9)
2. Midgut: small bowel, proximal ⅔ colon, and appendix associated with periumbilical pain (T9-T11)
3. Hindgut structures (distal ⅓ colon, descending colon, sigmoid colon, upper anal canal) associated with lower abdominal pain (T11-L1)\

Basically - you need to have a working knowledge of abdominal anatomy to accurately diagnose your patient's abdominal pain.

[2] List indications for bedside US in the ED patient with abdominal pain. (Table 24.3)

This information was adapted from Table 24.3 in Rosen's 9th edition, please refer back to the source as needed.

Common critical use of POCUS in abdominal pain:
-Pelvic: identification of ectopic pregnancy with or without hemorrhage
-Aorta: measurement of the aortic diameter for AAA
-FAST: detection of free intraperitoneal fluid indicating hemorrhage, pus, or extrusion of gut contents

Common emergent use of POCUS in abdominal pain:
-Pelvic: identification of an intrauterine pregnancy or ovarian torsion
-Biliary/RUQ: gallstones or a dilated common bile duct for choledocholithiasis, pericholecystic fluid and/or gallbladder wall thickening which may indicate cholecystitis
-Renal: hydronephrosis indicating possible obstructive uropathy
-FAST: free intraperitoneal fluid indicating ascites or hemorrhage
-Cardiac: Inferior vena cava distention or collapse as an indicator of volume status

[3] Explain how referred pain works in the setting of abdo pain. (Fig 24.2)

Referred pain = pain felt remotely from its source because peripheral afferent nerve fibers from many organs enter the spinal cord through nerve roots that have somatic afferents from other parts of the body. The short version is that the brain is not very good at interpreting pain signals coming from the viscera and misinterprets them as coming from the associated somatic regions. Thus - upper abdominal structures can refer pain to the chest, and lower structures can refer pain to the hips/retroperitoneum. Some other examples include epigastric pain and inferior MI, shoulder pain with diaphragmatic irritation, and a lower lobe PNA causing referred abdominal pain.