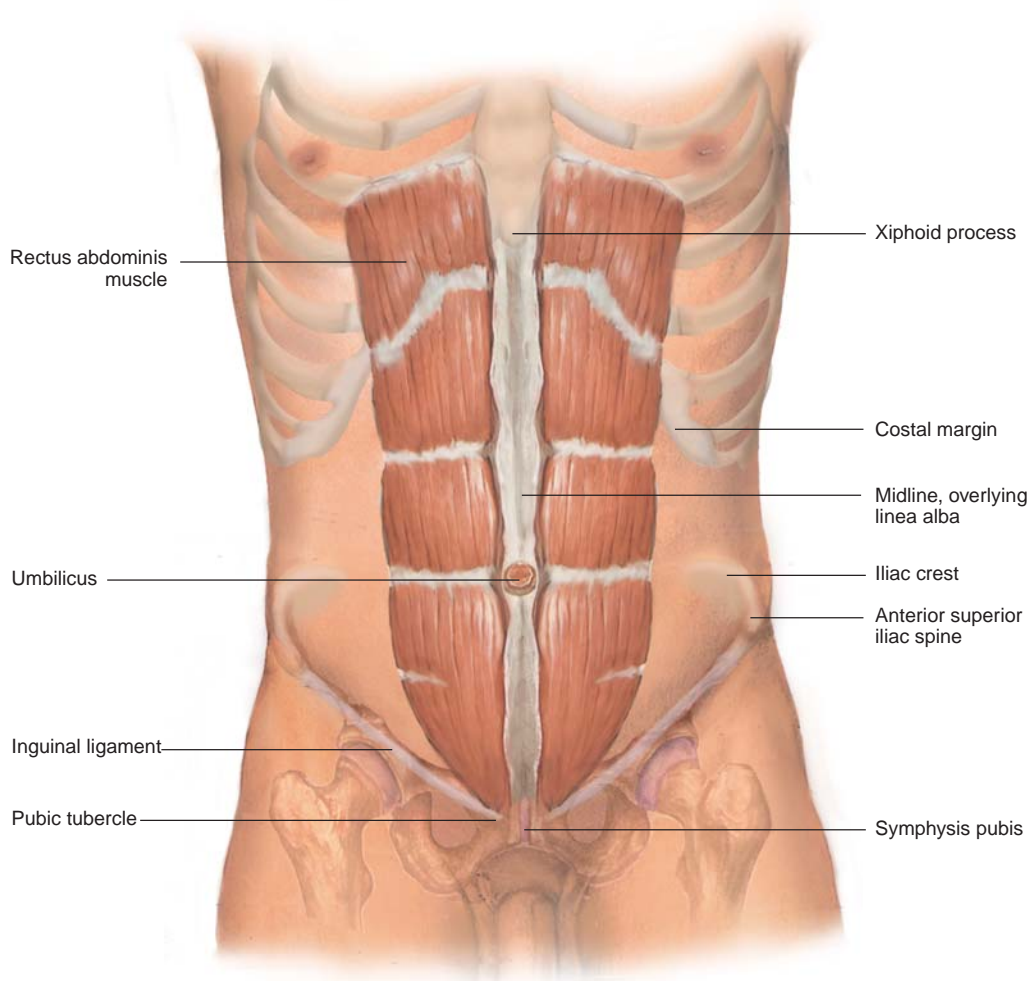


The Abdomen

ANATOMY AND PHYSIOLOGY

Visualize or palpate the landmarks of the abdominal wall and pelvis, as illustrated. The rectus abdominis muscles become more prominent when the patient raises the head and shoulders from the supine position.



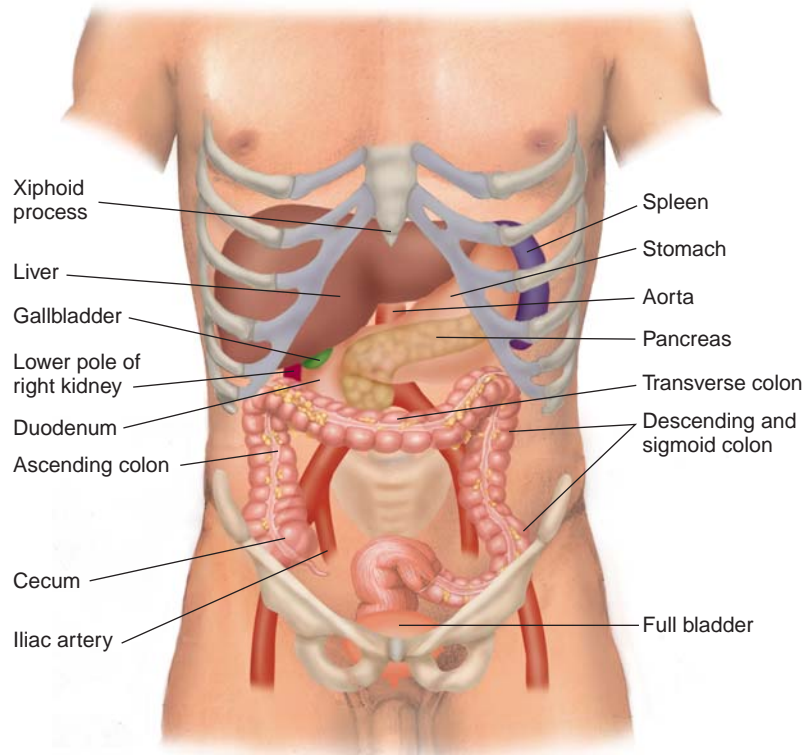
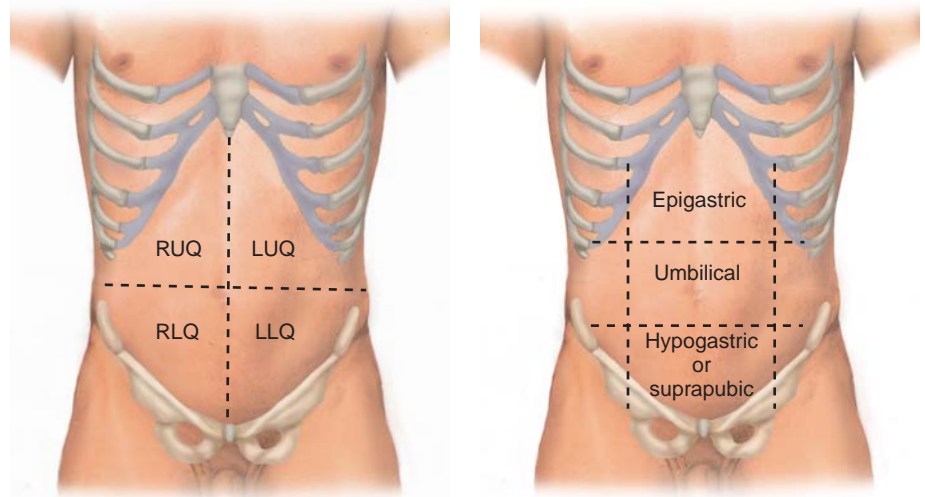
For descriptive purposes, the abdomen is often divided by imaginary lines crossing at the umbilicus, forming the right upper, right lower, left upper, and left lower quadrants. Another system divides the abdomen into nine sections. Terms for three of them are commonly used: epigastric, umbilical, and hypogastric or suprapubic.

When examining the abdomen and moving in a clockwise rotation, several organs are often palpable. Exceptions are the stomach and much of the liver and spleen. The abdominal cavity extends up under the rib cage to the dome of the diaphragm, placing these organs in a protected location, beyond the reach of the palpating hand.

In the *right upper quadrant*, the soft consistency of the *liver* makes it difficult to feel through the abdominal wall. The lower margin of the liver, the liver edge, is often palpable at the right costal margin. The *gallbladder*, which rests against the inferior surface of the liver, and the more deeply lying *duodenum* are generally not palpable. At a deeper level, the *lower pole of the right kidney* may be felt, especially in thin people with relaxed abdominal muscles. Moving medially, the examiner encounters the rib cage, which protects the stomach; occasionally patients misidentify the stony hard *xiphoid process* lying in the midline as a tumor. The *abdominal aorta* often has visible pulsations and is usually palpable in the upper abdomen.

In the *left upper quadrant*, the *spleen* is lateral to and behind the stomach, just above the left kidney in the left midaxillary line. Its upper margin rests against the dome of the diaphragm. The 9th, 10th, and 11th ribs protect most of the spleen. The tip of the spleen may be palpable below the left costal margin in a small percentage of adults. The *pancreas* in healthy people escapes detection.

In the *left lower quadrant* you can often feel the firm, narrow, tubular sigmoid *colon*. Portions of the transverse and descending colon may also be pal-



pable. In the lower midline are the *bladder*, the *sacral promontory*, the bony anterior edge of the S1 vertebra sometimes mistaken for a tumor, and in women, the *uterus* and *ovaries*.

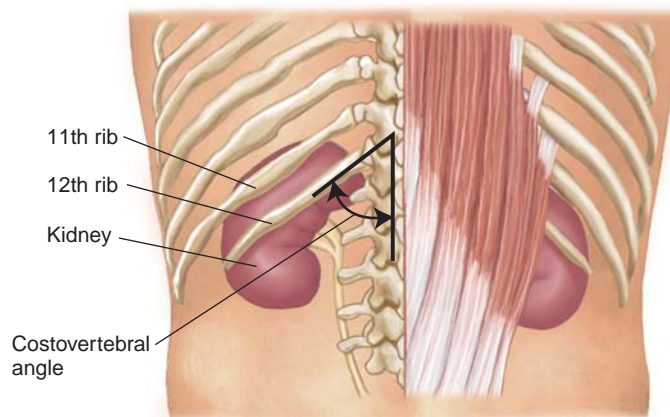
In the *right lower quadrant* are bowel loops and the *appendix* at the tail of the cecum near the junction of the small and large intestines. In healthy people, there will be no palpable findings.

A distended *bladder* may be palpable above the symphysis pubis. The bladder accommodates roughly 300 ml of urine filtered by the kidneys into the renal pelvis and the ureters. Bladder expansion stimulates contraction of bladder smooth muscle, the *detrusor muscle*, at relatively low pressures. Rising pressure in the bladder triggers the conscious urge to void.

Increased intraurethral pressure can overcome rising pressures in the bladder and prevent incontinence. Intraurethral pressure is related to factors such as smooth muscle tone in the internal urethral sphincter, the thickness of the urethral mucosa, and in women, sufficient support to the bladder and proximal urethra from pelvic muscles and ligaments to maintain proper anatomical relationships. Striated muscle around the urethra can also contract voluntarily to interrupt voiding.

Neuroregulatory control of the bladder functions at several levels. In infants, the bladder empties by reflex mechanisms in the sacral spinal cord. Voluntary control of the bladder depends on higher centers in the brain and on motor and sensory pathways between the brain and the reflex arcs of the sacral spinal cord. When voiding is inconvenient, higher centers in the brain can inhibit detrusor contractions until the capacity of the bladder, approximately 400 to 500 ml, is exceeded. The integrity of the sacral nerves that innervate the bladder can be tested by assessing perirectal and perineal sensation in the S2, S3, and S4 dermatomes (see p. 702).

The *kidneys* are posterior organs. The ribs protect their upper portions. The *costovertebral angle*—the angle formed by the lower border of the 12th rib and the transverse processes of the upper lumbar vertebrae—defines the region to assess for kidney tenderness.



POSTERIOR VIEW

THE HEALTH HISTORY

Common or Concerning Symptoms

Gastrointestinal Disorders	Urinary and Renal Disorders
<ul style="list-style-type: none"> • Abdominal pain, acute and chronic • Indigestion, nausea, vomiting including blood, loss of appetite, early satiety • Dysphagia and/or odynophagia • Change in bowel function • Diarrhea, constipation • Jaundice 	<ul style="list-style-type: none"> • Suprapubic pain • Dysuria, urgency, or frequency • Hesitancy, decreased stream in males • Polyuria or nocturia • Urinary incontinence • Hematuria • Kidney or flank pain • Ureteral colic

Gastrointestinal complaints rank high among reasons for office and emergency-room visits. You will encounter a wide variety of upper gastrointestinal symptoms, including abdominal pain, heartburn, nausea and vomiting, difficulty or pain with swallowing, vomiting of stomach contents or blood, loss of appetite, and jaundice. Abdominal pain alone accounted for more than 13 million office visits in 2004¹ and 7 million emergency-room visits in 2003.² Lower gastrointestinal complaints are also common: diarrhea, constipation, change in bowel habits, and blood in the stool, often described as either bright red or dark and tarry.

Numerous symptoms also originate in the *genitourinary tract*: difficulty urinating, urgency and frequency, hesitancy and decreased stream in men, high urine volume, urinating at night, incontinence, blood in the urine, and flank pain and colic from renal stones or infection.

Often you will need to cluster several findings from both the patient's story and your examination as you sort through various explanations for the patient's symptoms. Your skills in history-taking and examination will be needed for sound clinical reasoning.

Patterns and Mechanisms of Abdominal Pain. Before exploring gastrointestinal and genitourinary symptoms, review the mechanisms and clinical patterns of abdominal pain. Be familiar with three broad categories of abdominal pain:

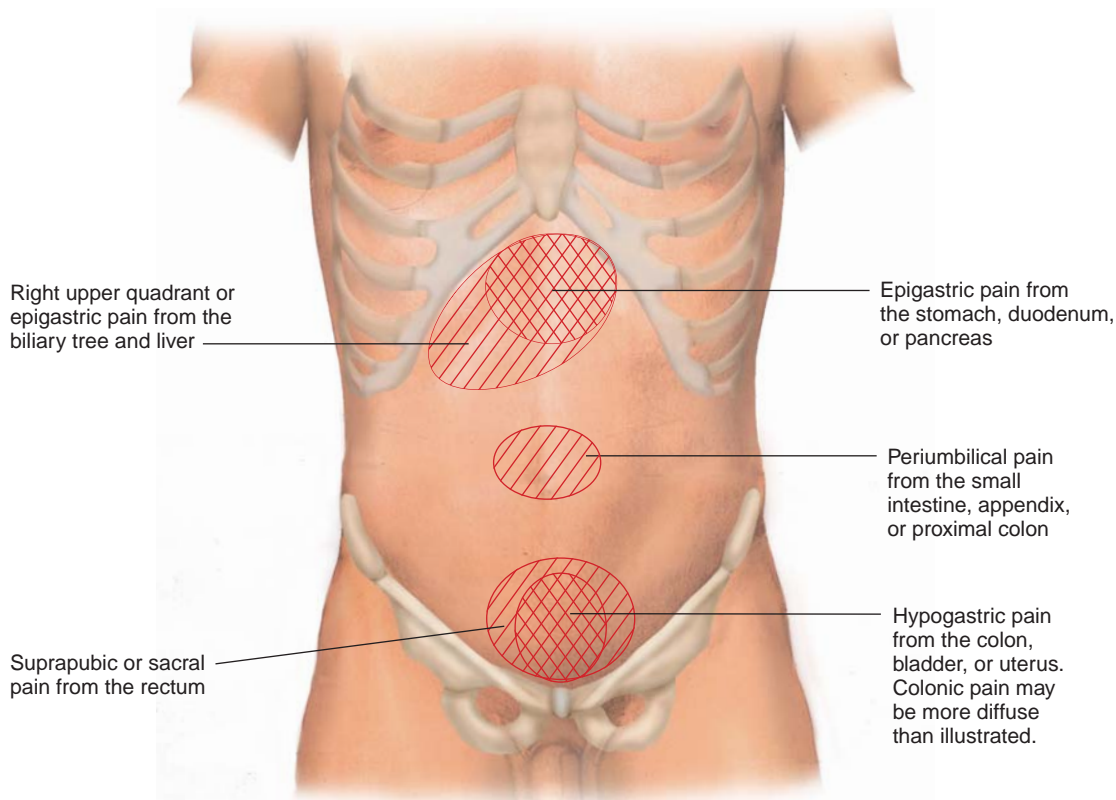
- *Visceral pain* occurs when hollow abdominal organs such as the intestine or biliary tree contract unusually forcefully or are distended or stretched. Solid organs such as the liver can also become painful when their capsules are stretched. Visceral pain may be difficult to localize. It is typically palpable near the midline at levels that vary according to the structure involved, as illustrated on the next page.

See Table 11-1 Abdominal Pain (pp. 454–455)

Visceral pain in the right upper quadrant may result from liver distention against its capsule in *alcoholic hepatitis*.

Visceral pain varies in quality and may be gnawing, burning, cramping, or aching. When it becomes severe, it may be associated with sweating, pallor, nausea, vomiting, and restlessness.

Visceral periumbilical pain may signify early *acute appendicitis* from distention of an inflamed appendix. It gradually changes to parietal pain in the right lower quadrant from inflammation of the adjacent parietal peritoneum.



TYPES OF VISCERAL PAIN

- *Parietal pain* originates from inflammation in the parietal peritoneum. It is a steady, aching pain that is usually more severe than visceral pain and more precisely localized over the involved structure. It is typically aggravated by movement or coughing. Patients with this type of pain usually prefer to lie still.
- *Referred pain* is felt in more distant sites, which are innervated at approximately the same spinal levels as the disordered structures. Referred pain often develops as the initial pain becomes more intense and thus seems to radiate or travel from the initial site. It may be felt superficially or deeply but is usually well localized.

Pain may also be referred to the abdomen from the chest, spine, or pelvis, thus complicating the assessment of abdominal pain.

Pain of duodenal or pancreatic origin may be referred to the back; pain from the biliary tree, to the right shoulder or the right posterior chest.

Pain from *pleurisy* or *acute myocardial infarction* may be referred to the epigastric area.



THE GASTROINTESTINAL TRACT

Upper Abdominal Pain, Discomfort, and Heartburn. The prevalence of recurrent upper abdominal discomfort or pain in the United States and other Western countries is approximately 25%.³ In recent years consensus statements from expert societies have clarified the definitions and classification of numerous abdominal symptoms, particularly the Rome III criteria for functional gastrointestinal disorders.⁴ Understanding carefully defined terminology will help you ascertain the patient's underlying condition.

Acute Upper Abdominal Pain or Discomfort. For patients complaining of abdominal pain, causes range from benign to life-threatening, so take the time to conduct a careful history.

- First determine the *timing of the pain*. Is it *acute or chronic*? Acute abdominal pain has many patterns. Did the pain start suddenly or gradually? When did it begin? How long does it last? What is its pattern over a 24-hour period? Over weeks or months? Are you dealing with an acute illness or a chronic and recurring one?
- Ask patients to *describe the pain in their own words*. Pursue important details: “Where does the pain start?” “Does it radiate or travel anywhere?” “What is the pain like?” If the patient has trouble describing the pain, try offering several choices: “Is it aching, burning, gnawing . . . ?”
- Then ask the patient to *point to the pain*. Patients are not always clear when they try to describe in words where pain is most intense. The quadrant where the pain is located can be helpful. Often underlying organs are involved. If clothes interfere, repeat the question during the physical examination.
- Ask the patient to rank the *severity of the pain* on a scale of 1 to 10. Note that severity does not always help you to identify the cause. Sensitivity to abdominal pain varies widely and tends to diminish in older patients, masking acute abdominal conditions. Pain threshold and how patients accommodate to pain during daily activities also affect ratings of severity.
- As you probe *factors that aggravate or relieve the pain*, pay special attention to any association with meals, alcohol, medications (including aspirin and aspirin-like drugs and any over-the-counter medications), stress, body position, and use of antacids. Ask if indigestion or discomfort is related to exertion and relieved by rest.

Chronic Upper Abdominal Discomfort or Pain. For more chronic symptoms, *dyspepsia* is defined as chronic or recurrent discomfort or pain centered in the upper abdomen.⁸ *Discomfort* is defined as a subjective negative feeling

Studies suggest that neuropeptides like 5-hydroxytryptophan and substance P mediate interconnected symptoms of pain, bowel dysfunction, and stress.⁴

In emergency rooms 40% to 45% of patients have nonspecific pain, but 15% to 30% need surgery, usually for appendicitis, intestinal obstruction, or cholecystitis.⁵

Doubling over with cramping colicky pain indicates *renal stone*. Sudden knifelike epigastric pain occurs in *gallstone pancreatitis*.⁶

Epigastric pain occurs with *gastritis* or *GERD*. Right upper quadrant and upper abdominal pain signify *cholecystitis*.⁷

Note that angina from inferior wall coronary artery disease may present as “indigestion,” but is precipitated by exertion and relieved by rest. See Table 9-1, Chest Pain, p. 375.

that is nonpainful. It can include various symptoms such as bloating, nausea, upper abdominal fullness, and heartburn.

- Note that bloating, nausea, or belching can occur alone and is seen in other disorders. When they occur alone they do not meet the criteria for dyspepsia.
- Many patients with upper abdominal discomfort or pain will have *functional, or nonulcer, dyspepsia*, defined as a 3-month history of nonspecific upper abdominal discomfort or nausea not attributable to structural abnormalities or peptic ulcer disease. Symptoms are usually recurring and typically present for more than 6 months.³

Many patients with chronic upper abdominal discomfort or pain complain primarily of *heartburn, acid reflux, or regurgitation*. If patients report these symptoms more than once a week, they are likely to have *gastroesophageal reflux disease (GERD)* until proven otherwise.^{8,9}

- *Heartburn* is a rising retrosternal burning pain or discomfort occurring weekly or more often.³ It is typically aggravated by food such as alcohol, chocolate, citrus fruits, coffee, onions, and peppermint; or positions like bending over, exercising, lifting, or lying supine.
- Some patients with GERD have *atypical respiratory symptoms* such as cough, wheezing, and aspiration pneumonia. Others complain of *pharyngeal symptoms*, such as hoarseness and chronic sore throat.¹⁰
- Some patients may have “*alarm symptoms*,” such as difficulty swallowing (dysphagia), pain with swallowing (odynophagia), recurrent vomiting, evidence of gastrointestinal bleeding, weight loss, anemia, or risk factors for gastric cancer.

Bloating may occur with *inflammatory bowel disease*, belching from *aerophagia*, or swallowing air.

Multifactorial causes include delayed gastric emptying (20%–40%), gastritis from *H. pylori* (20%–60%), peptic ulcer disease (up to 15% if *H. pylori* is present), and psychosocial factors.³

These symptoms or mucosal damage on endoscopy are the diagnostic criteria for GERD. Risk factors include reduced salivary flow, which prolongs acid clearance by damping action of the bicarbonate buffer; delayed gastric emptying; selected medications; and hiatal hernia.

Note that angina from inferior wall coronary ischemia along the diaphragm may present as heartburn. See Table 9-1, Chest Pain, p. 375.

Patients with uncomplicated GERD who do not respond to empiric therapy, patients older than 55 years, and those with “alarm symptoms” warrant endoscopy to detect esophagitis, peptic strictures, or Barrett’s esophagus (in this condition the squamocolumnar junction is displaced proximally and replaced by intestinal metaplasia, increasing the risk of esophageal cancer 30-fold).^{9,11,12} Approximately 50% of patients with GERD will have no disease on endoscopy.¹³

Lower Abdominal Pain and Discomfort—Acute and Chronic. Lower abdominal pain and discomfort may be acute or chronic. Asking the patient to point to the pain and characterize all its features, combined with findings on physical examination, will help you identify possible causes. Some acute pain, especially in the suprapubic area or radiating from the flank, originates in the genitourinary tract (see p. 428).

Acute Lower Abdominal Pain. Patients may complain of *acute pain* localized to the *right lower quadrant*. Find out if it is sharp and continuous or intermittent and cramping, causing them to double over.

When patients report acute pain in the *left lower quadrant* or *diffuse abdominal pain*, investigate associated symptoms such as fever and loss of appetite.

Chronic Lower Abdominal Pain. If there is *chronic pain* in the quadrants of the lower abdomen, ask about change in bowel habits and alternating diarrhea and constipation.

Gastrointestinal Symptoms Associated With Abdominal Pain. Patients often experience abdominal pain in conjunction with other symptoms. “How is your appetite?” is a good starting question that may lead to other concerns like *indigestion*, *nausea*, *vomiting*, and *anorexia*. *Indigestion* is a general term for distress associated with eating that can have many meanings. Urge your patient to be more specific.

- *Nausea*, often described as “feeling sick to my stomach,” may progress to retching and vomiting. *Retching* describes involuntary spasm of the stomach, diaphragm, and esophagus that precedes and culminates in *vomiting*, the forceful expulsion of gastric contents out of the mouth.

Right lower quadrant pain or pain that migrates from the periumbilical region, combined with abdominal wall rigidity on palpation, is most likely to predict *appendicitis*. In women other causes include *pelvic inflammatory disease*, *ruptured ovarian follicle*, and *ectopic pregnancy*.¹⁴

Cramping pain radiating to the right or left lower quadrant may be a renal stone.

Left lower quadrant pain with a palpable mass may be *diverticulitis*. Diffuse abdominal pain with absent bowel sounds and firmness, guarding, or rebound on palpation indicates *small or large bowel obstruction* (see p. 454).

Change in bowel habits with mass lesion indicates *colon cancer*. Intermittent pain for 12 weeks of the preceding 12 months with relief from defecation, change in frequency of bowel movements, or change in form of stool (loose, watery, pellet-like), without structural or biochemical abnormalities are symptoms of *irritable bowel syndrome*.¹⁵

Anorexia, nausea, and vomiting accompany many gastrointestinal disorders; these are all seen in pregnancy, *diabetic ketoacidosis*, *adrenal insufficiency*, *hypercalcemia*, *uremia*, liver disease, emotional states, adverse drug reactions, and other conditions. Induced vomiting without nausea is more indicative of *anorexia/bulimia*.

Some patients may not actually vomit but raise esophageal or gastric contents without nausea or retching, called *regurgitation*.

Ask about any vomitus or regurgitated material and inspect it if possible. What color is it? What does the vomitus smell like? How much has there been? You may have to help the patient with the amount: a teaspoon? Two teaspoons? A cupful?

Ask specifically if the vomitus contains any blood, and quantify the amount. Gastric juice is clear and mucoid. Small amounts of yellowish or greenish bile are common and have no special significance. Brownish or blackish vomitus with a “coffee grounds” appearance suggests blood altered by gastric acid. Coffee-grounds emesis or red blood is termed *hematemesis*.

Is there any dehydration or electrolyte imbalance from prolonged vomiting, or significant blood loss? Do the patient’s symptoms suggest any complications of vomiting, such as aspiration into the lungs, seen in debilitated, obtunded, or elderly patients?

- *Anorexia* is loss or lack of appetite. Find out if it arises from intolerance to certain foods or reluctance to eat because of anticipated discomfort. Check for associated symptoms of nausea and vomiting.

Patients may complain of unpleasant *abdominal fullness* after light or moderate meals, or *early satiety*, the inability to eat a full meal. A dietary assessment or recall may be warranted (see Chapter 4, General Survey, Vital Signs, and Pain, pp. 106–107).

Other Gastrointestinal Symptoms

Dysphagia and/or Odynophagia. Less commonly, patients may report difficulty swallowing from impaired passage of solid foods or liquids from the mouth to the stomach, or *dysphagia*. Food seems to stick, hesitate, or “not go down right,” suggesting motility disorders or structural anomalies. The sensation of a lump in the throat or the retrosternal area unassociated with swallowing is not true dysphagia.

Ask the patient to point to where the dysphagia occurs.

Regurgitation occurs in *GERD*, *esophageal stricture*, and *esophageal cancer*.

Vomiting and pain indicate *small bowel obstruction*. Fecal odor occurs with *small bowel obstruction* or *gastrocolic fistula*.

Hematemesis may accompany *esophageal or gastric varices*, *gastritis*, or *peptic ulcer disease*.

Symptoms of blood loss such as lightheadedness or syncope depend on the rate and volume of bleeding and are rare until blood loss exceeds 500 ml.

Consider *diabetic gastroparesis*, *anticholinergic medications*, *gastric outlet obstruction*, *gastric cancer*; early satiety in *hepatitis*.

For types of dysphagia, see Table 11-2, *Dysphagia*, p. 456.

Indicators of *oropharyngeal dysphagia* include drooling, nasopharyngeal regurgitation, and cough from aspiration in muscular or neurologic disorders affecting motility; gurgling or regurgitation of undigested food occur in structural conditions like *Zenker’s diverticulum*.

Pointing to below the sternoclavicular notch indicates *esophageal dysphagia*.

Pursue which types of foods provoke symptoms: solid foods, or solids and liquids? Establish the timing. When does the dysphagia start? Is it intermittent or persistent? Is it progressing? If so, over what time period? Are there associated symptoms and medical conditions?

If solid foods, consider structural esophageal conditions like esophageal stricture, web or Schatzki's ring, neoplasm; if solids and liquids, a motility disorder is more likely.

Is there *odynophagia*, or pain on swallowing?

Consider esophageal ulceration from radiation, caustic ingestion, or infection from *Candida*, *cytomegalovirus*, *herpes simplex*, or *HIV*. Can be pill-induced (aspirin, non-steroidal anti-inflammatory agents).

Change in Bowel Function. You will frequently need to assess *bowel function*. Start with open-ended questions: "How are your bowel movements?" "How frequent are they?" "Do you have any difficulties?" "Have you noticed any change?" The range of normal is broad. Current parameters suggest a minimum may be as low as two bowel movements per week.

Some patients may complain of passing excessive gas, or *flatus*, normally about 600 ml per day.

Consider aerophagia, legumes or other gas-producing foods, *intestinal lactase deficiency*, *irritable bowel syndrome*.

Diarrhea and Constipation. Patients vary widely in their views of diarrhea and constipation. Increased water content of the stool results in *diarrhea*, or stool volume greater than 200 grams in 24 hours. Patients, however, usually focus on the change to loose watery stools or increased frequency.

See Table 11-3, Constipation (p. 457) and Table 11-4, Diarrhea (pp. 458–459).

Ask about the duration. *Acute diarrhea* lasts 2 weeks or fewer. *Chronic diarrhea* is defined as lasting 4 weeks or more.

Acute diarrhea is usually caused by infection;¹⁶ chronic diarrhea is typically noninfectious in origin, as in *Crohn's disease* and *ulcerative colitis*.

Query the characteristics of the diarrhea, including volume, frequency, and consistency.

High-volume, frequent watery stools usually are from the small intestine; small-volume stools with tenesmus, or diarrhea with mucus, pus, or blood occur in rectal inflammatory conditions.

Is there mucus, pus, or blood? Is there associated *tenesmus*, a constant urge to defecate, accompanied by pain, cramping, and involuntary straining?

Nocturnal diarrhea usually has pathologic significance.

Does diarrhea occur at night?

Are the stools greasy or oily? Frothy? Foul-smelling? Floating on the surface because of excessive gas?

Oily residue, sometimes frothy or floating, occurs with *steatorrhea*, or fatty diarrheal stools, from malabsorption in *celiac sprue*, *pancreatic insufficiency*, and *small bowel bacterial overgrowth*.

Associated features are important in identifying possible causes. Pursue current medications, including alternative medicines and especially antibiotics, recent travel, diet patterns, baseline bowel habits, and risk factors for immunocompromise.

Diarrhea is common with use of penicillins and macrolides, magnesium-based antacids, metformin, and herbal and alternative medicines.

Another common symptom is *constipation*. Recent definitions stipulate that constipation should be present for at least 12 weeks of the prior 6 months with at least two of the following conditions: fewer than 3 bowel movements per week; 25% or more defecations with either straining or sensation of incomplete evacuation; lumpy or hard stools; or manual facilitation.¹⁷

Ask about frequency of bowel movements, passage of hard or painful stools, straining, and a sense of incomplete rectal emptying or pressure.

Check if the patient actually looks at the stool and can describe its color and bulk.

Thin, pencil-like stool occurs in an obstructing “apple-core” lesion of the sigmoid colon.

What remedies has the patient tried? Do medications or stress play a role? Are there associated systemic disorders?

Consider medications such as anticholinergic agents, calcium-channel blockers, iron supplements, and opiates. Constipation also occurs with *diabetes*, *hypothyroidism*, *hypercalcemia*, *multiple sclerosis*, *Parkinson’s disease*, and *systemic sclerosis*.

Occasionally there is no passage of either feces or gas, or *obstipation*.

Obstipation signifies *intestinal obstruction*.

Inquire about the color of stools. Is there *melena*, or black tarry stools, or *hematochezia*, stools that are red or maroon-colored? Pursue such important details as quantity and frequency of any blood.

See Table 11-5, Black and Bloody Stools, p. 460.

Melena may appear with as little as 100 ml of *upper gastrointestinal bleeding*, hematochezia if more than 1000 ml of blood, usually from *lower gastrointestinal bleeding*.

Is it mixed in with stool or on the surface? Is it streaks on the toilet paper or more copious?

Blood on the surface or toilet paper may occur with *hemorrhoids*.

Jaundice. In some patients, you will be struck by jaundice or icterus, the yellowish discoloration of the skin and sclerae from increased levels of bilirubin, a bile pigment derived chiefly from the breakdown of hemoglobin. Normally the hepatocytes conjugate, or combine, unconjugated bilirubin with other substances, making the bile water soluble, and then excrete it into the bile. The bile passes through the cystic duct into the common bile duct, which also drains the extrahepatic ducts from the liver. More distally the

common bile duct and the pancreatic ducts empty into the duodenum at the ampulla of Vater. Mechanisms of jaundice include the following:

- Increased production of bilirubin
- Decreased uptake of bilirubin by the hepatocytes
- Decreased ability of the liver to conjugate bilirubin
- Decreased excretion of bilirubin into the bile, resulting in absorption of *conjugated* bilirubin back into the blood.

Intrahepatic jaundice can be *hepatocellular*, from damage to the hepatocytes, or *cholestatic*, from impaired excretion as a result of damaged hepatocytes or intrahepatic bile ducts. *Extrahepatic* jaundice arises from obstruction of the extrahepatic bile ducts, most commonly the cystic and common bile ducts.

As you assess the patient with jaundice, pay special attention to the associated symptoms and the setting in which the illness occurred. What was the *color of the urine* as the patient became ill? When the level of conjugated bilirubin increases in the blood, it may be excreted into the urine, turning the urine a dark yellowish brown or tea color. Unconjugated bilirubin is not water-soluble, so it is not excreted into urine.

Ask also about the *color of the stools*. When excretion of bile into the intestine is completely obstructed, the stools become gray or light colored, or *acholic*, without bile.

Does the skin itch without other obvious explanation? Is there associated pain? What is its pattern? Has it been recurrent in the past?

Ask about risk factors for liver diseases, such as:

- *Hepatitis*: Travel or meals in areas of poor sanitation, ingestion of contaminated water or foodstuffs (hepatitis A); parenteral or mucous membrane exposure to infectious body fluids such as blood, serum, semen, and saliva, especially through sexual contact with an infected partner or use of shared needles for injection drug use (hepatitis B); intravenous illicit drug use; or blood transfusion (hepatitis C)
- *Alcoholic hepatitis* or *alcoholic cirrhosis* (interview the patient carefully about alcohol use)
- *Toxic liver damage* from medications, industrial solvents, or environmental toxins

Predominantly unconjugated bilirubin occurs from the first three mechanisms, as in *hemolytic anemia* (increased production) and *Gilbert's syndrome*.

Impaired excretion of conjugated bilirubin occurs with *viral hepatitis*, *cirrhosis*, *primary biliary cirrhosis*, and drug-induced cholestasis, as from oral contraceptives, methyl testosterone, and chlorpromazine.

Gallstones or *pancreatic carcinoma* may obstruct the common bile duct.

Dark urine from bilirubin indicates impaired excretion of bilirubin into the gastrointestinal tract.

Acholic stools may occur briefly in *viral hepatitis*; they are common in obstructive jaundice.

Itching indicates cholestatic or obstructive jaundice; pain may signify a distended liver capsule, *biliary cholic*, or *pancreatic cancer*.

- *Gallbladder disease or surgery* that may result in extrahepatic biliary obstruction
- *Hereditary disorders* in the Family History



THE URINARY TRACT

General questions for a urinary history include: “Do you have any difficulty passing your urine?” “How often do you go?” “Do you have to get up at night? How often?” “How much urine do you pass at a time?” “Is there any pain or burning?” “Do you ever have trouble getting to the toilet in time?” “Do you ever leak any urine? Or wet yourself involuntarily?” Does the patient sense when the bladder is full and when voiding occurs?

Ask women if sudden coughing, sneezing, or laughing makes them lose urine. Roughly half of young women report this experience even before bearing children. Occasional leakage is not necessarily significant. Ask older men, “Do you have trouble starting your stream?” “Do you have to stand close to the toilet to void?” “Is there a change in the force or size of your stream, or straining to void?” “Do you hesitate or stop in the middle of voiding?” “Is there dribbling when you’re through?”

Suprapubic Pain. Disorders in the urinary tract may cause pain in either the abdomen or the back. Bladder disorders may cause *suprapubic pain*. In *bladder infection*, pain in the lower abdomen is typically dull and pressure-like. In sudden overdistention of the bladder, pain is often agonizing; in contrast, chronic bladder distention is usually painless.

Dysuria, Urgency, or Frequency. Infection or irritation of either the bladder or urethra often provokes several symptoms. Frequently there is *pain on urination*, usually felt as a burning sensation. Some clinicians refer to this as *dysuria*, whereas others reserve the term *dysuria* for difficulty voiding. Women may report internal urethral discomfort, sometimes described as a pressure or an external burning from the flow of urine across irritated or inflamed labia. Men typically feel a burning sensation proximal to the glans penis. In contrast, *prostatic pain* is felt in the perineum and occasionally in the rectum.

Other associated symptoms are common. Urinary *urgency* is an unusually intense and immediate desire to void, sometimes leading to involuntary voiding or *urge incontinence*. Urinary *frequency*, or abnormally frequent voiding, may occur. Ask about any related fever or chills, blood in the urine, or any pain in the abdomen, flank, or back (see illustration on next page). Men with partial obstruction to urinary outflow often report *hesitancy* in starting the urine stream, *straining to void*, *reduced caliber and force of the urinary stream*, or *dribbling* as voiding is completed.

See Table 11-6, Frequency, Nocturia, and Polyuria (p. 461).

Involuntary voiding or lack of awareness suggests cognitive or neurosensory deficits.

Stress incontinence arises from decreased intraurethral pressure (see pp. 462–463).

These problems are common in men with partial bladder outlet obstruction from *benign prostatic hyperplasia*; also seen with *urethral stricture*.

Pain of sudden overdistention accompanies acute urinary retention.

Painful urination accompanies *cystitis* or *urethritis*.

If dysuria, consider bladder stones, foreign bodies, tumors; also *acute prostatitis*. In women, internal burning occurs in *urethritis*, and external burning in *vulvovaginitis*.

Urgency suggests bladder infection or irritation. In men, painful urination without frequency or urgency suggests *urethritis*.

See Table 15-2, Abnormalities of the Prostate (pp. 568–569).

Polyuria or Nocturia. Three additional terms describe important alterations in the pattern of urination. *Polyuria* refers to a significant increase in 24-hour urine volume, roughly defined as exceeding 3 liters. It should be distinguished from urinary frequency, which can involve voiding in high amounts, seen in polyuria, or in small amounts, as in infection. *Nocturia* refers to urinary frequency at night, sometimes defined as awakening the patient more than once; urine volumes may be large or small. Clarify the patient's daily fluid intake. Note any change in nocturnal voiding patterns and the number of trips to the bathroom.

Urinary Incontinence. Up to 30% of older patients are concerned about *urinary incontinence*, an involuntary loss of urine that may become socially embarrassing or cause problems with hygiene. If the patient reports incontinence, ask when it happens and how often. Find out if the patient is leaking small amounts of urine with increased intra-abdominal pressure from coughing, sneezing, laughing, or lifting. Or is it difficult for the patient to hold the urine once there is an urge to void, and loss of large amounts of urine? Is there a sensation of bladder fullness, frequent leakage, or voiding of small amounts but difficulty emptying the bladder?

As described earlier, bladder control involves complex neuroregulatory and motor mechanisms (see p. 417). Several central or peripheral nerve lesions may affect normal voiding. Can the patient sense when the bladder is full? And when voiding occurs? Although there are four broad categories of incontinence, a patient may have a combination of causes.

In addition, the patient's functional status may significantly affect voiding behaviors even when the urinary tract is intact. Is the patient mobile? Alert? Able to respond to voiding cues and reach the bathroom? Is alertness or voiding affected by medications?

Hematuria. Blood in the urine, or *hematuria*, is an important cause for concern. When visible to the naked eye, it is called *gross hematuria*. The urine may appear frankly bloody. Blood may be detected only during microscopic urinalysis, known as *microscopic hematuria*. Smaller amounts of blood may tinge the urine with a pinkish or brownish cast. In women, be sure to distinguish menstrual blood from hematuria. If the urine is reddish, ask about ingestion of beets or medications that might discolor the urine. Test the urine with a dipstick and microscopic examination before you settle on the term *hematuria*.

Kidney or Flank Pain; Ureteral Colic. Disorders of the urinary tract may also cause *kidney pain*, often reported as *flank pain* at or below the posterior costal margin near the costovertebral angle. It may radiate anteriorly toward the umbilicus. Kidney pain is a visceral pain usually produced by distention of the renal capsule and typically dull, aching, and steady. *Ureteral pain* is dramatically different. It is usually severe and colicky, originating at the costovertebral angle and radiating around the trunk into the lower quadrant of the abdomen, or possibly into the upper thigh and testicle or labium. Ureteral pain results from sudden distention of the ureter and associated distention of the renal pelvis. Ask about any associated fever, chills, or hematuria.

Abnormally high renal production of urine suggests polyuria. Frequency without polyuria during the day or night suggests bladder disorder or impairment to flow at or below the bladder neck.

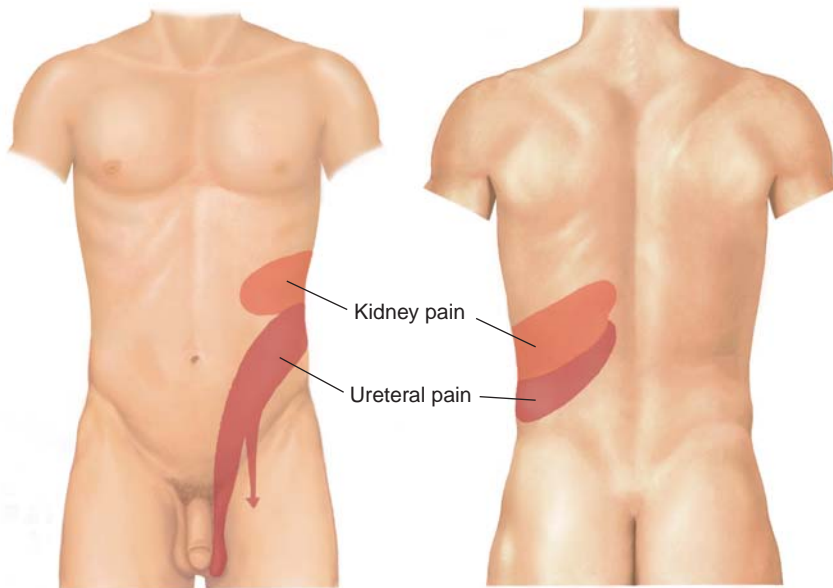
See Table 11-7, Urinary Incontinence (pp. 462–463).

Stress incontinence with increased intra-abdominal pressure suggests decreased contractility of urethral sphincter or poor support of bladder neck; *urge incontinence*, if unable to hold the urine, suggests detrusor overactivity; *overflow incontinence*, when the bladder cannot be emptied until bladder pressure exceeds urethral pressure, indicates anatomical obstruction by prostatic hypertrophy or stricture, or neurogenic abnormalities.

Functional incontinence may arise from impaired cognition, musculoskeletal problems, or immobility.

Kidney pain, fever, and chills occur in *acute pyelonephritis*.

Renal or ureteral colic is caused by sudden obstruction of a ureter, for example, from urinary stones or blood clots.



HEALTH PROMOTION AND COUNSELING

Important Topics for Health Promotion and Counseling

- Screening for alcohol abuse
- Risk factors for hepatitis A, B, and C
- Screening for colon cancer

Screening for Alcohol Abuse. Alert clinicians often notice clues of unhealthy alcohol use from social patterns and behavioral problems that emerge during the history. The patient may report past episodes of pancreatitis, family history of alcoholism, or arrest for driving under the influence of alcohol. Examination of the abdomen may reveal such classic findings as hepatosplenomegaly, ascites, or even *caput medusa*, a collateral pathway of recanalized umbilical veins radiating up the abdomen that decompresses portal vein hypertension.

Alcohol abuse or dependence is on the rise, affecting 8.5% of the U.S. population, or 17.6 million people.¹⁸ Lifetime prevalence is approximately 13.5%, and in emergency rooms and trauma admissions, prevalence reaches 30% to 40% and 50% respectively.^{19,20} The addictions are increasingly viewed as chronic relapsing behavioral disorders with substance-induced rearrangements of brain neurotransmitters resulting in tolerance, physical dependence, sensitization, craving, and relapse (see p. 144). Alcohol addiction has numerous sequelae and is highly correlated with fatal car accidents, suicide and other mental health disorders, family disruption, violence, hypertension, cirrhosis, and malignancies of the upper gastrointestinal tract and liver.

Other classic findings include spider angiomas, palmar erythema, and peripheral edema.

See Chapter 5, Behavior and Mental Status, pp. 143–144.

Because early at-risk behaviors may be hard to identify, knowledge of basic alcohol screening criteria is critical. The U.S. Preventive Services Task Force recommends screening and behavioral counseling interventions for all adults in primary care settings, including pregnant women.²¹ If your patient drinks alcoholic beverages, choose one of three well-validated screening tools: the CAGE questionnaire, the Alcohol Use Disorders Identification Test (AUDIT), or the screening question about heavy drinking days, “How many times in the past year have you had 4 or more drinks a day (women) or 5 or more drinks a day (men)?” Cutoffs for risky or hazardous drinking are:

- Women: ≥ 3 drinks per occasion and ≥ 7 drinks per week
- Men: ≥ 4 drinks per occasion and ≥ 14 drinks per week

Tailor your recommendations for treatment to the severity of the problem, ranging from brief interventions to inpatient detoxification to long-term rehabilitation (see Chapter 5, Behavior and Mental Status, p. 144).

Risk Factors for Hepatitis A, B, and C. The mainstay for protecting adults against viral hepatitis is adherence to vaccination guidelines for hepatitis A and hepatitis B, the most effective method for preventing infection and transmission. Educating patients about how the hepatitis viruses spread and the benefits of vaccination for groups at risk is also important.

Hepatitis A. Transmission of hepatitis A is fecal:oral: fecal shedding by those handling food causes contamination of water and foods, leading to infection for those in close contact in households and extended family settings. Infected children are often asymptomatic and play a key role in spreading infection. In 2006 the CDC recommended hepatitis A vaccination for children and for persons at increased risk for infection, such as travelers to endemic areas, male–male partners, injection and illicit drug users, and persons with chronic liver disease. For immediate protection and prophylaxis for household contacts and travelers, immune serum globulin can be administered before and within 2 weeks of contact with hepatitis A. Advise hand-washing with soap and water before bathroom use, changing diapers, and preparing and eating food.^{22,23}

Hepatitis B. Hepatitis B poses more serious threats to patient health. Approximately 95% of infections in healthy adults are self-limited, with elimination of the virus from blood and development of immunity.²⁴ Chronic infection occurs in 5% of those older than 5 years, and approximately 15% of those infected after childhood die prematurely from cirrhosis or liver cancer. Most (approximately 70%) are asymptomatic until they develop advanced liver disease. The Centers for Disease Control and Prevention has identified three risk categories:

- *Sexual contacts*, including sex partners for those already infected, people with more than one sex partner in the prior 6 months, people seeking evaluation and treatment for sexually transmitted diseases, and men having sex with men

See the four CAGE questions, Chapter 3, Interviewing and the Health History, p. 84.

- *People with percutaneous or mucosal exposure to blood*, including injection drug users, household contacts of antigen-positive persons, residents and staff of facilities for the developmentally disabled, health-care workers, and people on dialysis
- *Other*, including travelers to endemic areas, people with chronic liver disease and HIV infection, and people seeking protection from hepatitis B infection

The Centers for Disease Control and Prevention issued new recommendations for expanded hepatitis B immunization in 2006.²⁴ The following groups should receive vaccination:

- All adults in high-risk settings, such as STD clinics, HIV testing and treatment programs, drug-abuse treatment programs and programs for injection drug users, correctional facilities, programs for men having sex with men, chronic hemodialysis facilities and end-stage renal disease programs, and facilities for people with developmental disabilities
- In primary care and specialty settings, adults in at-risk groups or requesting the hepatitis B vaccine even without acknowledging a specific risk factor
- Adults in occupations involving exposure to blood or other potentially infectious body fluids

The U.S. Preventive Services Task Force recommends screening for all pregnant women at their first prenatal visit.²²

Hepatitis C. Hepatitis C is transmitted by repeated percutaneous exposure to blood and is present in approximately 2% of U.S. adults. However, prevalence reaches 50% to 90% in groups at high risk.²² The strongest risk factors are injection drug use and transfusion with clotting factors before 1987. Additional risk factors include hemodialysis, sex partners using injection drugs, blood transfusion or organ transplant before 1992, undiagnosed liver disease, infants born to infected mothers, occupational exposure, and multiple sex partners or an infected sex partner. Sexual transmission is rare. Chronic infection occurs in 55% to 85% of those infected; chronic liver disease occurs in 70% of those with chronic infections.²⁵ There is no vaccine for prevention, so screening for risk factors and referral of those infected, plus counseling to avoid risk factors, including tattoos, are critical.

Screening for Colorectal Cancer. Colorectal cancer is the third most common cancer in both men and women and accounts for almost 10% of all cancer deaths.²⁶ More than 90% of cases occur after age 50, primarily from neoplastic changes in adenomatous polyps. Mortality rates are declining, reflecting improvements in early detection and treatment. Recent evidence has prompted revision of screening guidelines by multi-society task forces, including the American Cancer Society in both 2003 and 2006, placing new emphasis on risk stratification, use of colonoscopy, and post-polypectomy management.^{27,28}

- *Assessing risk status.* Clinicians should assess risk status when patients are around age 20 by asking the questions below. If 50 years or older, patients answering no to these three questions are at *average risk*; if younger than 50 years, no screening is indicated. A positive response warrants screening for increased or high colorectal cancer risk and referral for more complex patient management.^{27,28}
 - Has the patient had colorectal cancer or an adenomatous polyp?
 - Does the patient have an illness such as inflammatory bowel disease that increases risk for colorectal cancer?
 - Has a family member had colorectal cancer or an adenomatous polyp? If so, how many, at what age, and was it a first-degree relative (parent, sibling, or child)?
- *Screening for people at average risk.* Because no one screening option is clearly superior, beginning at age 50 average-risk patients should be offered one of the following five options:
 - Fecal occult blood test (FOBT) annually, using six samples and tested without rehydration. Single samples have a sensitivity for detecting advanced neoplasia of approximately 5%, compared with approximately 24% using six samples, so a single-sample office test is not sufficient.^{29,30} Aggressive follow-up with colonoscopy is recommended for a positive test on any specimen.
 - Flexible sigmoidoscopy every 5 years
 - Combined FOBT and flexible sigmoidoscopy
 - Colonoscopy every 10 years
 - Double-contrast barium enema every 5 years
- *Screening for people at increased risk.* Colonoscopy at the intervals noted below is indicated for the following increased risk factors:
 - Single small adenoma (<1 cm): 3 to 6 years after initial polypectomy
 - Single large adenoma (>1 cm), multiple adenomas, adenoma with high-grade dysplasia or villous change: within 3 years of initial polypectomy
 - History of resection of colorectal cancer: within 1 year after resection
 - Any first-degree relative younger than 60 years, two or more first-degree relatives with either colorectal cancer or adenomatous polyps: at age 40 or 10 years before youngest case in immediate family, whichever is earlier. Approximately 15% of those with colorectal cancer have familial disease.³¹
- *Screening for people at high risk.* High-risk factors include family history of familial adenomatous polyposis (found in ~1% of colorectal cancers);

family history of hereditary nonpolyposis colon cancer (in approximately 3% to 4%); and history of inflammatory bowel disease, chronic ulcerative colitis, or Crohn's disease. Referral, genetic testing, and early surveillance are recommended in these groups.^{28,31,32}

Other Risk Factors for Colorectal Cancer. Some studies show possible increased risk from diabetes (approximately 30% increase), alcohol use, obesity, smoking, and high-fat diet. Some evidence suggests that several factors may be protective: diet high in fruits and vegetables; diet high in fiber; regular physical activity; and use of aspirin or nonsteroidal anti-inflammatory agents (NSAIDs). Study findings remain conflicting about the benefits of high-fiber and low-fat high fruit and vegetable diets.^{33,34} The U.S. Preventive Services Task Force recommends *against* routine use of aspirin and NSAIDs to prevent colorectal cancer in average-risk people because of poor-quality evidence that these agents lead to a reduction in colorectal cancer mortality and good evidence of increased incidence of gastrointestinal bleeding and renal impairment.³⁵

TECHNIQUES OF EXAMINATION

For a skilled abdominal examination, you need good light and a relaxed and well-draped patient, with exposure of the abdomen from just above the xiphoid process to the symphysis pubis. The groin should be visible. The genitalia should remain draped. The abdominal muscles should be relaxed to enhance all aspects of the examination, but especially palpation.

Tips for Enhancing Examination of the Abdomen

- Check that the patient has an empty bladder.
- Make the patient comfortable in the supine position, with a pillow under the head and perhaps another under the knees. Slide your hand under the low back to see if the patient is relaxed and lying flat on the table.
- Ask the patient to keep the arms at the sides or folded across the chest. If the arms are above the head, the abdominal wall stretches and tightens, making palpation difficult. Move the gown to below the nipple line, and the drape to the level of the symphysis pubis.
- Before you begin palpation, ask the patient to point to any areas of pain so you can examine these areas last.
- Warm your hands and stethoscope. To warm your hands, rub them together or place them under hot water. You can also palpate through the patient's gown to absorb warmth from the patient's body before exposing the abdomen.
- Approach the patient calmly and avoid quick, unexpected movements. *Watch the patient's face for any signs of pain or discomfort.* Make sure you avoid long fingernails.
- Distract the patient if necessary with conversation or questions. If the patient is frightened or ticklish, begin palpation with the patient's hand under yours. After a few moments, slip your hand underneath to palpate directly.

An arched back thrusts the abdomen forward and tightens the abdominal muscles.

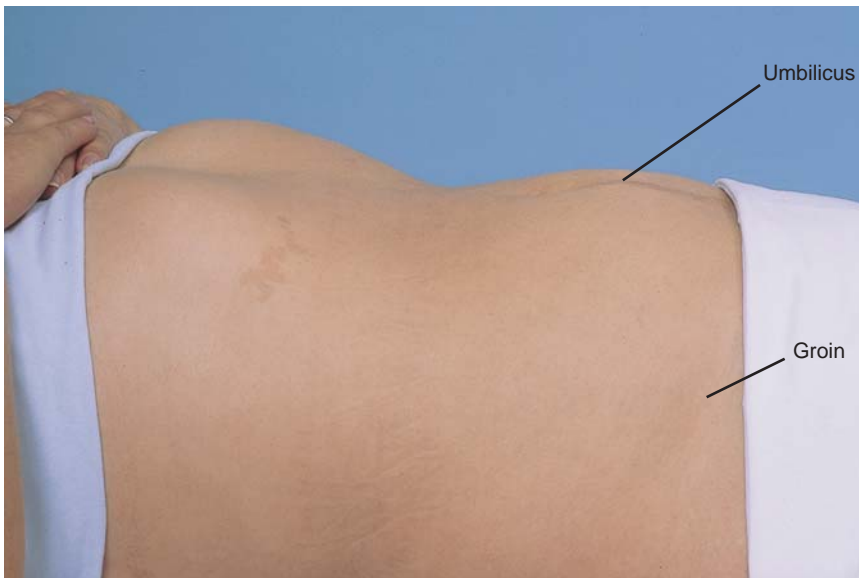
Visualize each organ in the region you are examining. Stand at the patient's right side and proceed in an orderly fashion with inspection, auscultation, percussion, and palpation. Assess the liver, spleen, kidneys, and aorta.



THE ABDOMEN

Inspection

Starting from your usual standing position at the right side of the bed, inspect the abdomen. As you look at the contour of the abdomen, watch for peristalsis. It is helpful to sit or bend down so that you can view the abdomen tangentially.



Inspect the surface, contours, and movements of the abdomen, including the following:

- *The skin.* Note:

Scars. Describe or diagram their location.

Striae. Old silver striae or stretch marks are normal.

Dilated veins. A few small veins may be visible normally.

Rashes and lesions

- *The umbilicus.* Observe its contour and location and any inflammation or bulges suggesting a hernia.

- *The contour of the abdomen*

Is it flat, rounded, protuberant, or scaphoid (markedly concave or hollowed)?

Do the flanks bulge, or are there any local bulges? Also survey the inguinal and femoral areas.

Is the abdomen symmetric?

Are there visible organs or masses? Look for an enlarged liver or spleen that has descended below the rib cage.

Pink–purple striae of *Cushing's syndrome*

Dilated veins of *hepatic cirrhosis* or of *inferior vena cava obstruction*

See Table 11-8, *Localized Bulges in the Abdominal Wall* (p. 464).

See Table 11-9, *Protuberant Abdomens* (p. 465).

Bulging flanks of *ascites*; supra-pubic bulge of a distended bladder or pregnant uterus; hernias

Asymmetry from an enlarged organ or mass

Lower abdominal mass of an ovarian or a uterine tumor

- **Peristalsis.** Observe for several minutes if you suspect intestinal obstruction. Peristalsis may be visible normally in very thin people.
- **Pulsations.** The normal aortic pulsation is frequently visible in the epigastrium.

Increased peristaltic waves of intestinal obstruction

Increased pulsation of an aortic aneurysm or of increased pulse pressure

Auscultation

Auscultation provides important information about bowel motility. *Listen to the abdomen before performing percussion or palpation because these maneuvers may alter the frequency of bowel sounds.* Practice auscultation until you are thoroughly familiar with variations in normal bowel sounds and can detect changes suggestive of inflammation or obstruction. Auscultation may also reveal *bruits*, or vascular sounds resembling heart murmurs, over the aorta or other arteries in the abdomen.

See Table 11-10, Sounds in the Abdomen (p. 466).

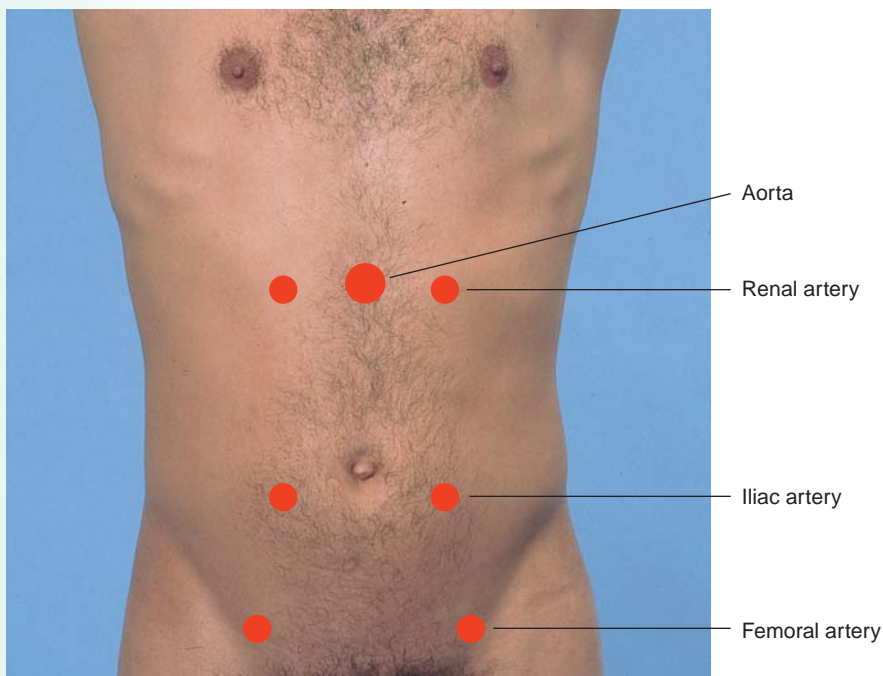
Bruits suggest vascular occlusive disease.

Place the diaphragm of your stethoscope gently on the abdomen. Listen for bowel sounds and note their frequency and character. Normal sounds consist of clicks and gurgles, occurring at an estimated frequency of 5 to 34 per minute. Occasionally you may hear *borborygmi*—prolonged gurgles of hyperperistalsis—the familiar “stomach growling.” Because bowel sounds are widely transmitted through the abdomen, listening in one spot, such as the right lower quadrant, is usually sufficient.

Bowel sounds may be altered in diarrhea, intestinal obstruction, paralytic ileus, and peritonitis.

Abdominal Bruits and Friction Rub. If the patient has high blood pressure, listen in the epigastrium and in each upper quadrant for *bruits*. Later in the examination, when the patient sits up, listen also in the costovertebral angles. Epigastric bruits confined to systole may be heard normally.

A bruit in one of these areas that has both systolic and diastolic components strongly suggests renal artery stenosis as the cause of hypertension.



Listen for bruits over the aorta, the iliac arteries, and the femoral arteries. Bruits confined to systole are relatively common, however, and do not necessarily signify occlusive disease.

Bruits with both systolic and diastolic components suggest the turbulent blood flow of *partial arterial occlusion* or *arterial insufficiency*.

Listening points for bruits in these vessels are illustrated on the previous page.

Listen over the liver and spleen for *friction rubs*.

Friction rubs in liver tumor, gonococcal infection around the liver, splenic infarction

Percussion

Percussion helps you to assess the amount and distribution of gas in the abdomen and to identify possible masses that are solid or fluid-filled. Its use in estimating the size of the liver and spleen will be described in later sections.

Percuss the abdomen lightly in all four quadrants to assess the distribution of *tympany* and *dullness*. Tympany usually predominates because of gas in the gastrointestinal tract, but scattered areas of dullness from fluid and feces are also typical.

A protuberant abdomen that is tympanitic throughout suggests *intestinal obstruction*. See Table 11-9, Protuberant Abdomens (p. 465).

- Note any large dull areas that might indicate an underlying mass or enlarged organ. This observation will guide your palpation.
- On each side of a protuberant abdomen, note where abdominal tympany changes to the dullness of solid posterior structures.

Pregnant uterus, ovarian tumor, distended bladder, large liver or spleen

Dullness in both flanks prompts further assessment for ascites (see pp. 448–449).

Briefly percuss the lower anterior chest, between the lungs above and costal margins below. On the right, you will usually find the dullness of the liver; on the left, the tympany that overlies the gastric air bubble and the splenic flexure of the colon.

In situs inversus (rare), organs are reversed: air bubble on the right, liver dullness on the left.

Palpation

Light Palpation. Feeling the abdomen gently is especially helpful for identifying abdominal tenderness, muscular resistance, and some superficial organs and masses. It also serves to reassure and relax the patient.

Keeping your hand and forearm on a horizontal plane, with fingers together and flat on the abdominal surface, palpate the abdomen with a light, gentle, dipping motion. When moving your hand from place to place, raise it just off the skin. Moving smoothly, feel in all quadrants.

Identify any superficial organs or masses and any area of tenderness or increased resistance to your hand. If resistance is present, try to distinguish voluntary guarding from involuntary muscular spasm. To do this:

- Try all the relaxing methods you know (see p. 434).

Involuntary rigidity (muscular spasm) typically persists despite these maneuvers. It indicates *peritoneal inflammation*.



- Feel for the relaxation of abdominal muscles that normally accompanies exhalation.
- Ask the patient to mouth-breathe with the jaw dropped open.

Voluntary guarding usually decreases with these maneuvers.

Deep Palpation. This is usually required to delineate abdominal masses. Again using the palmar surfaces of your fingers, feel in all four quadrants. Identify any masses and note their location, size, shape, consistency, tenderness, pulsations, and any mobility with respiration or with the examining hand. Correlate your palpable findings with their percussion notes.

Abdominal masses may be categorized in several ways: physiologic (pregnant uterus), inflammatory (*diverticulitis* of the colon), vascular (an abdominal aortic aneurysm), neoplastic (carcinoma of the colon), or obstructive (a distended bladder or dilated loop of bowel).

Assessment for Peritoneal Inflammation. Abdominal pain and tenderness, especially when associated with muscular spasm, suggest inflammation of the parietal peritoneum. Localize the pain as accurately as possible. First, even before palpation, *ask the patient to cough* and determine where the cough produces pain. Then, *palpate gently with one finger* to map the tender area. Pain produced by light percussion has similar localizing value. These gentle maneuvers may be all you need to establish an area of peritoneal inflammation.

Abdominal pain with coughing or light percussion suggests peritoneal inflammation. See Table 11-11, Tender Abdomens (pp. 467–468).

**TWO-HANDED DEEP PALPATION**

If not, look for *rebound tenderness*. Press down with your fingers firmly and slowly, then withdraw them quickly. Watch and listen to the patient for signs of pain. Ask the patient “Which hurts more, when I press or let go?” Have the patient locate the pain exactly. Pain induced or increased by quick withdrawal constitutes *rebound tenderness* caused by rapid movement of an inflamed peritoneum.

Rebound tenderness suggests peritoneal inflammation. If tenderness is felt elsewhere than where you were trying to elicit rebound, that area may be the real source of the problem.

THE LIVER

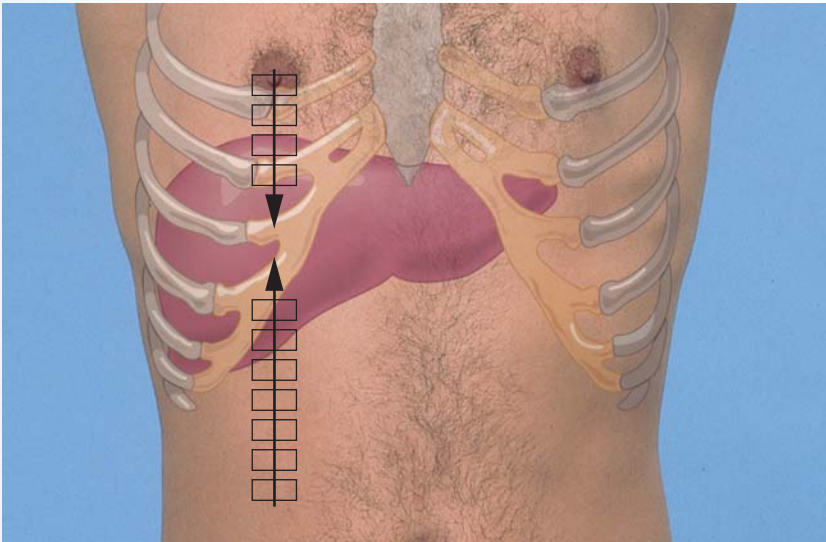
Because the rib cage shelters most of the liver, assessment is difficult. Liver size and shape can be estimated by percussion and perhaps palpation, however, and the palpating hand helps you to evaluate its surface, consistency, and tenderness.

Percussion

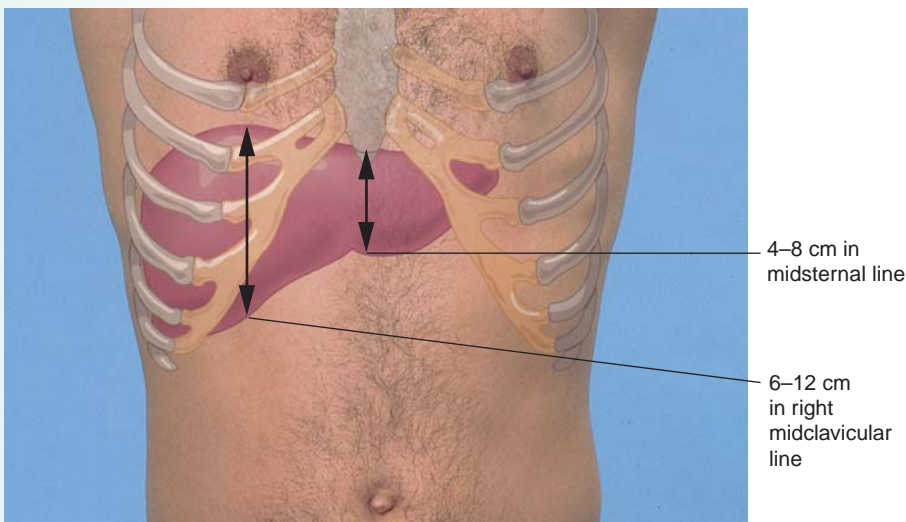
Measure the vertical span of liver dullness in the right midclavicular line. Locate the midclavicular line carefully to avoid inaccurate measurement from use of a “wandering landmark.” Use a light to moderate percussion stroke, because examiners with a heavier stroke underestimate liver size.³⁶ Starting at a level below the umbilicus (in an area of tympany, not dullness), percuss upward toward the liver. Identify the *lower border of dullness* in the midclavicular line.

Next, identify the *upper border of liver dullness* in the midclavicular line. Starting at the nipple line, lightly percuss from lung resonance down toward liver dullness. Gently displace a woman’s breast as necessary to be sure that you start in a resonant area. The course of percussion is shown next.

The span of liver dullness is increased when the liver is enlarged.

**PERCUSSING LIVER SPAN**

Now measure in centimeters the distance between your two points—the vertical span of liver dullness. Normal liver spans, shown below, are generally greater in men than in women and greater in tall people than in short people. If the liver seems to be enlarged, outline the lower edge by percussing in other areas.

**NORMAL LIVER SPANS**

Measurements of liver span by percussion are more accurate when the liver is enlarged with a palpable edge.³⁷

The span of liver dullness is *decreased* when the liver is small, or when free air is present below the diaphragm, as from a *perforated hollow viscus*. Serial observations may show a decreasing span of dullness with resolution of *hepatitis* or *congestive heart failure* or, less commonly, with progression of *fulminant hepatitis*.

Liver dullness may be displaced downward by the low diaphragm of *chronic obstructive pulmonary disease*. Span, however, remains normal.

Dullness of a right pleural effusion or consolidated lung, if adjacent to liver dullness, may falsely *increase* the estimate of liver size.

Gas in the colon may produce tympany in the right upper quadrant, obscure liver dullness, and falsely *decrease* the estimate of liver size.

Only about half of livers with an edge below the right costal margin are palpable, but when the edge is palpable, the likelihood of hepatomegaly roughly doubles.³⁶

Palpation

Place your left hand behind the patient, parallel to and supporting the right 11th and 12th ribs and adjacent soft tissues below. Remind the patient to relax on your hand if necessary. By pressing your left hand forward, the patient's liver may be felt more easily by your other hand.



Place your right hand on the patient's right abdomen lateral to the rectus muscle, with your fingertips well below the lower border of liver dullness. Some examiners like to point their fingers up toward the patient's head, whereas others prefer a somewhat more oblique position, as shown on the next page. In either case, press gently in and up.

Ask the patient to take a deep breath. Try to feel the liver edge as it comes down to meet your fingertips. If you feel it, lighten the pressure of your palpating hand slightly so that the liver can slip under your finger pads and you can feel its anterior surface. Note any tenderness. If palpable at all, the normal liver edge is soft, sharp, and regular, with a smooth surface. The normal liver may be slightly tender.

On inspiration, the liver is palpable about 3 cm below the right costal margin in the midclavicular line. Some people breathe more with the chest than with the diaphragm. It may be helpful to train such a patient to "breathe with the abdomen," thus bringing the liver, as well as the spleen and kidneys, into a palpable position during inspiration.

Firmness or hardness of the liver, bluntness or rounding of its edge, and irregularity of its contour suggest an abnormality of the liver.

An obstructed, distended gallbladder may form an oval mass below the edge of the liver and merge with it. It is dull to percussion.



In order to feel the liver, you may have to alter your pressure according to the thickness and resistance of the abdominal wall. If you cannot feel it, move your palpating hand closer to the costal margin and try again.

Try to trace the liver edge both laterally and medially. Palpation through the rectus muscles, however, is especially difficult. Describe or sketch the liver edge, and measure its distance from the right costal margin in the midclavicular line.

The “hooking technique” may be helpful, especially when the patient is obese. Stand to the right of the patient’s chest. Place both hands, side by side, on the right abdomen below the border of liver dullness. Press in with your fingers and up toward the costal margin. Ask the patient to take a deep breath. The liver edge shown below is palpable with the fingerpads of both hands.



The edge of an enlarged liver may be missed by starting palpation too high in the abdomen, as shown above.

See Table 11-12, Liver Enlargement: Apparent and Real (p. 469).



Assessing Percussion Tenderness of a Nonpalpable Liver. Place your left hand flat on the lower right rib cage and then gently strike your hand with the ulnar surface of your right fist. Ask the patient to compare the sensation with that produced by a similar strike on the left side.

Tenderness over the liver suggests inflammation, as in *hepatitis*, or congestion, as in *heart failure*.

THE SPLEEN

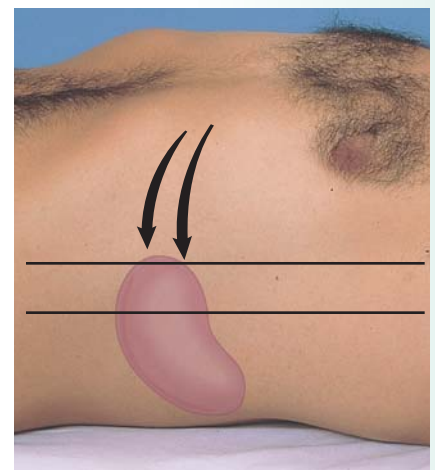
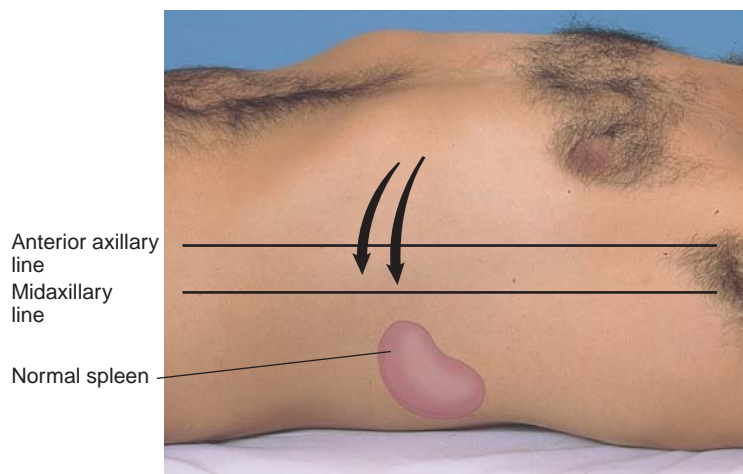
When a spleen enlarges, it expands anteriorly, downward, and medially, often replacing the tympany of stomach and colon with the dullness of a solid organ. It then becomes palpable below the costal margin. Percussion suggests but does not confirm splenic enlargement. Palpation can confirm the enlargement but often misses large spleens that do not descend below the costal margin.

Percussion

Two techniques may help you to detect *splenomegaly*, an enlarged spleen:

- *Percuss the left lower anterior chest wall* between lung resonance above and the costal margin, an area termed *Traube's space*. As you percuss along the routes suggested by the arrows in the following figures, note the lateral extent of tympany. Percussion is moderately accurate in detecting splenomegaly (sensitivity, 60%–80%; specificity, 72%–94%).³⁸

If percussion dullness is present, palpation correctly detects presence or absence of splenomegaly more than 80% of the time.³⁸

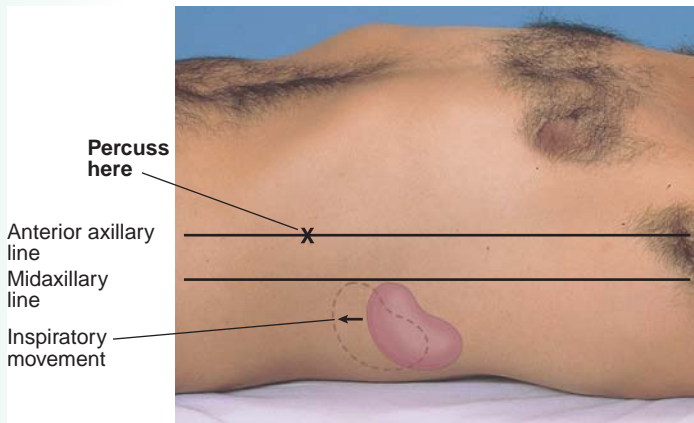


If tympany is prominent, especially laterally, splenomegaly is not likely. The dullness of a normal spleen is usually hidden within the dullness of other posterior tissues.

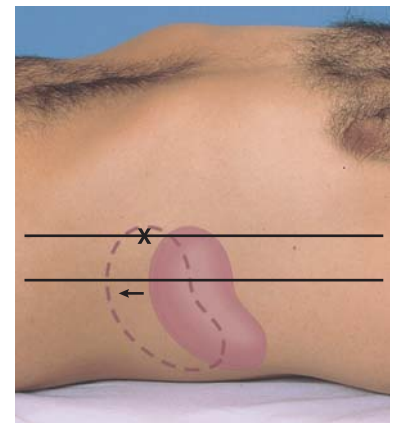
Fluid or solids in the stomach or colon may also cause dullness in Traube's space.

- *Check for a splenic percussion sign.* Percuss the lowest interspace in the left anterior axillary line, as shown next. This area is usually tympanitic. Then ask the patient to take a deep breath, and percuss again. When spleen size is normal, the percussion note usually remains tympanitic.

A change in percussion note from tympany to dullness on inspiration suggests splenic enlargement. This is a *positive splenic percussion sign*.



NEGATIVE SPLENIC PERCUSSION SIGN



POSITIVE SPLENIC PERCUSSION SIGN

If either or both of these tests is positive, pay extra attention to palpation of the spleen.

The splenic percussion sign may also be positive when spleen size is normal.

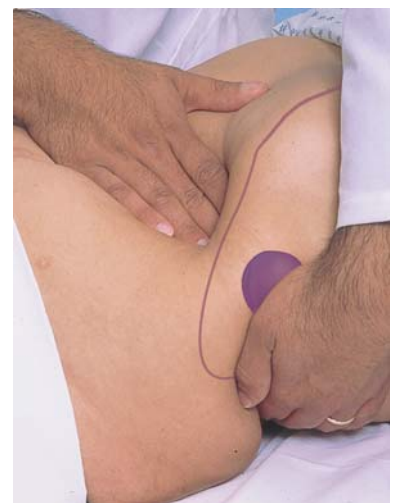
Palpation

With your left hand, reach over and around the patient to support and press forward the lower left rib cage and adjacent soft tissue. With your right hand below the left costal margin, press in toward the spleen. Begin palpation low enough so that you are below a possibly enlarged spleen. (If your hand is close to the costal margin, moreover, it is not sufficiently mobile to reach up under the rib cage.) Ask the patient to take a deep breath. Try to feel the tip or edge of the spleen as it comes down to meet your fingertips. Note any tenderness, assess the splenic contour, and measure the distance between the spleen's lowest point and the left costal margin. In approximately 5% of normal adults, the tip of the spleen is palpable. Causes include a low, flat diaphragm, as in chronic obstructive pulmonary disease, and a deep inspiratory descent of the diaphragm.

An enlarged spleen may be missed if the examiner starts too high in the abdomen to feel the lower edge.

Splenomegaly is eight times more likely when the spleen is palpable.³⁶ Causes include portal hypertension, hematologic malignancies, HIV infection, and splenic infarct or hematoma.

The spleen tip below is just palpable deep to the left costal margin.



Repeat with the patient lying on the right side with legs somewhat flexed at hips and knees. In this position, gravity may bring the spleen forward and to the right into a palpable location.



Umbilicus

PALPATING THE SPLEEN—PATIENT LYING ON RIGHT SIDE

The enlarged spleen is palpable about 2 cm below the left costal margin on deep inspiration.



THE KIDNEYS

Palpation

Although kidneys are not usually palpable, you should learn and practice the techniques for examination. Detecting an enlarged kidney may prove to be very important.

Palpation of the Left Kidney. Move to the patient's left side. Place your right hand behind the patient, just below and parallel to the 12th rib, with your fingertips just reaching the costovertebral angle. Lift, trying to displace the kidney anteriorly. Place your left hand gently in the left upper quadrant, lateral and parallel to the rectus muscle. Ask the patient to take a deep breath. At the peak of inspiration, press your left hand firmly and deeply into the left upper quadrant, just below the costal margin, and try to “capture” the kidney between your two hands. Ask the patient to breathe out and then to stop breathing briefly. Slowly release the pressure of your left hand, feeling at the same time for the kidney to slide back into its expiratory position. If the kidney is palpable, describe its size, contour, and any tenderness.

Alternatively, try to feel for the left kidney by a method similar to feeling for the spleen. With your left hand, reach over and around the patient to lift the left loin, and with your right hand feel deep in the left upper quadrant. Ask the patient to take a deep breath, and feel for a mass. A normal left kidney is rarely palpable.

A left flank mass may represent marked *splenomegaly* or an enlarged left kidney. Suspect *splenomegaly* if a notch is palpated on medial border, the edge extends beyond the midline, percussion is dull, and your fingers can probe deep to the medial and lateral borders but *not* between the mass and the costal margin. Confirm findings with further evaluation.

Attributes favoring an *enlarged kidney* over an enlarged spleen include preservation of normal tympany in the left upper quadrant and the ability to probe with your fingers between the mass and the costal margin, but not deep to its medial and lower borders.

Palpation of the Right Kidney. To capture the right kidney, return to the patient's right side. Use your left hand to lift from in back, and your right hand to feel deep in the left upper quadrant. Proceed as before.

A normal right kidney may be palpable, especially in thin, well-relaxed women. It may or may not be slightly tender. The patient is usually aware of a capture and release. Occasionally, a right kidney is located more anteriorly than usual and then must be distinguished from the liver. The edge of the liver, if palpable, tends to be sharper and to extend farther medially and laterally. It cannot be captured. The lower pole of the kidney is rounded.



Causes of kidney enlargement include hydronephrosis, cysts, and tumors. Bilateral enlargement suggests *polycystic kidney disease*.

Assessing Percussion Tenderness of the Kidneys. You may note tenderness when examining the abdomen, but also search for it at each costovertebral angle. Pressure from your fingertips may be enough to elicit tenderness, but if not, use fist percussion. Place the ball of one hand in the costovertebral angle and strike it with the ulnar surface of your fist. Use enough force to cause a perceptible but painless jar or thud in a normal person.

To save the patient needless exertion, integrate this assessment with your examination of the back (see p. 20).



Pain with pressure or fist percussion suggests *pyelonephritis* but may also have a musculoskeletal cause.

ASSESSING COSTOVERTEBRAL ANGLE TENDERNESS



THE BLADDER

The bladder normally cannot be examined unless it is distended above the symphysis pubis. On palpation, the dome of the distended bladder feels smooth and round. Check for tenderness. Use percussion to check for dullness and to determine how high the bladder rises above the symphysis pubis.

Bladder distention from outlet obstruction due to *urethral stricture*, *prostatic hyperplasia*; also from medications and neurologic disorders such as *stroke*, *multiple sclerosis*.

Suprapubic tenderness in *bladder infection*



THE AORTA

Press firmly deep in the upper abdomen, slightly to the left of the midline, and identify the aortic pulsations. In people older than age 50, assess the width of the aorta by pressing deeply in the upper abdomen with one hand on each side of the aorta, as illustrated. In this age group, a normal aorta is not more than 3.0 cm wide (average, 2.5 cm). This measurement does not include the thickness of the abdominal wall. The ease of feeling aortic pulsations varies greatly with the thickness of the abdominal wall and with the anteroposterior diameter of the abdomen.

Risk factors for abdominal aortic aneurysm (AAA) are age 65 years or older, history of smoking, male gender, and a first-degree relative with a history of AAA repair.^{39,40}



A periumbilical or upper abdominal mass with expansile pulsations that is 3 cm or more wide suggests an AAA. Sensitivity of palpation increases as AAAs enlarge: for widths of 3.0–3.9 cm, 29%; 4.0–4.9 cm, 50%; ≥ 5.0 cm, 76%.⁴¹

Screening by palpation followed by ultrasound decreases mortality, especially in male smokers 65 years or older. Pain may signal rupture. Rupture is 15 times more likely in AAAs >4 cm than in smaller aneurysms.⁴¹

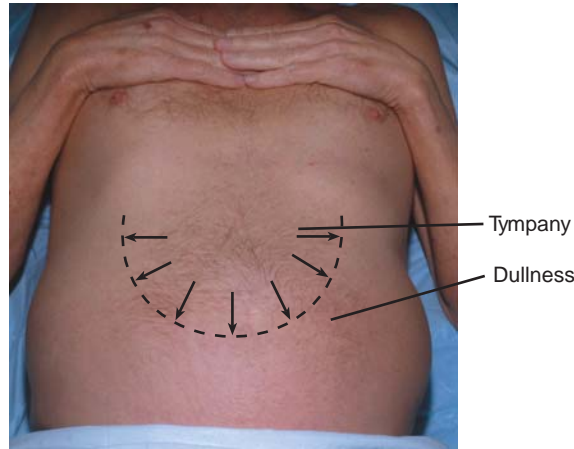
SPECIAL TECHNIQUES

Assessment Techniques for:

- Ascites
- Appendicitis
- Acute cholecystitis
- Ventral hernia
- Mass in abdominal wall

Assessing Possible Ascites

A protuberant abdomen with bulging flanks suggests the possibility of ascitic fluid. Because ascitic fluid characteristically sinks with gravity, whereas gas-filled loops of bowel float to the top, percussion gives a dull note in dependent areas of the abdomen. Look for such a pattern by percussing outward in several directions from the central area of tympany. Map the border between tympany and dullness.

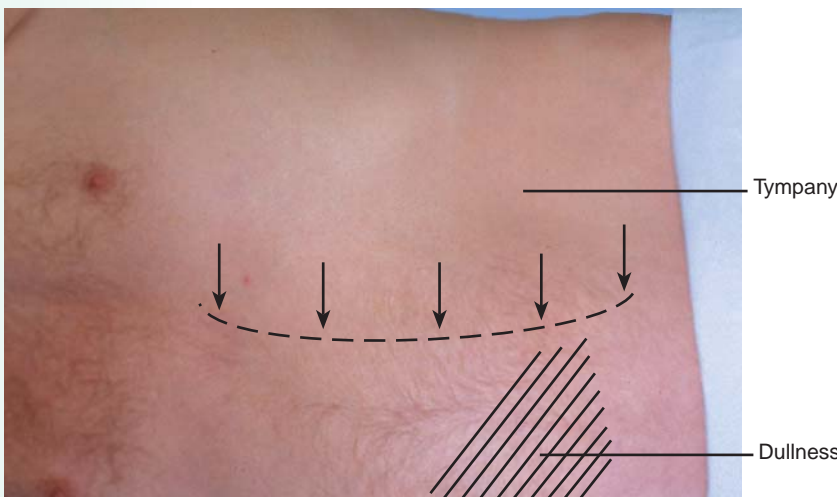


Ascites from increased hydrostatic pressure in cirrhosis, congestive heart failure, constrictive pericarditis, or inferior vena cava or hepatic vein obstruction; from decreased osmotic pressure in nephrotic syndrome, malnutrition. Also in ovarian cancer.

Two additional techniques help to confirm ascites, although both signs may be misleading.

- *Test for shifting dullness.* After mapping the borders of tympany and dullness, ask the patient to turn onto one side. Percuss and mark the borders again. In a person without ascites, the borders between tympany and dullness usually stay relatively constant.

In ascites, dullness shifts to the more dependent side, whereas tympany shifts to the top.



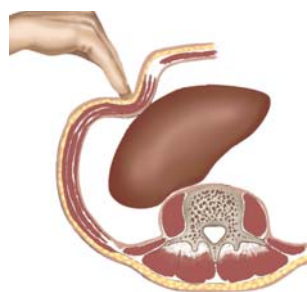
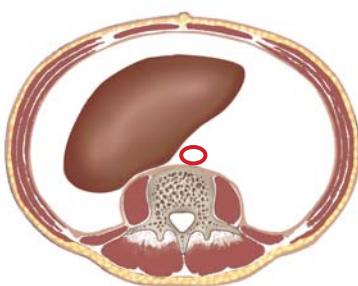
PATIENT LYING ON RIGHT SIDE

- **Test for a fluid wave.** Ask the patient or an assistant to press the edges of both hands firmly down the midline of the abdomen. This pressure helps to stop the transmission of a wave through fat. While you tap one flank sharply with your fingertips, feel on the opposite flank for an impulse transmitted through the fluid. Unfortunately, this sign is often negative until ascites is obvious, and it is sometimes positive in people without ascites.

An easily palpable impulse suggests ascites. A positive fluid wave, shifting dullness, and peripheral edema make the diagnosis of ascites highly likely (likelihood ratios of 3.0–6.0).⁴²



Identifying an Organ or a Mass in an Ascitic Abdomen. Try to *ballot* the organ or mass, exemplified here by an enlarged liver. Straighten and stiffen the fingers of one hand together, place them on the abdominal surface, and make a brief jabbing movement directly toward the anticipated structure. This quick movement often displaces the fluid so that your fingertips can briefly touch the surface of the structure through the abdominal wall.



Assessing Possible Appendicitis

- Ask the patient to point to where the pain began and where it is now. Ask the patient to cough. Determine whether and where pain results.
- Search carefully for an area of local tenderness.
- Feel for muscular rigidity.
- *Perform a rectal examination and, in women, a pelvic examination.* These maneuvers may not help you to discriminate between a normal and an inflamed appendix, but they may help to identify an inflamed appendix atypically located within the pelvic cavity. They may also suggest other causes of the abdominal pain.

Additional techniques are sometimes helpful:

- Check the tender area for rebound tenderness. (If other signs are typically positive, you can save the patient unnecessary pain by omitting this test.)
- Check for *Rovsing's sign* and for referred rebound tenderness. Press deeply and evenly in the *left* lower quadrant. Then quickly withdraw your fingers.
- Look for a *psoas sign*. Place your hand just above the patient's right knee and ask the patient to raise that thigh against your hand. Alternatively, ask the patient to turn onto the left side. Then extend the patient's right leg at the hip. Flexion of the leg at the hip makes the psoas muscle contract; extension stretches it.
- Look for an *obturator sign*. Flex the patient's right thigh at the hip, with the knee bent, and rotate the leg internally at the hip. This maneuver stretches the internal obturator muscle. (Internal rotation of the hip is described on p. 624.)
- Test for *cutaneous hyperesthesia*. At a series of points down the abdominal wall, gently pick up a fold of skin between your thumb and index finger, without pinching it. This maneuver should not normally be painful.

The pain of *appendicitis* classically begins near the umbilicus, then shifts to the right lower quadrant, where coughing increases it. Older patients report this pattern less frequently than younger ones.¹⁴

Localized tenderness anywhere in the right lower quadrant, even in the right flank, may indicate *appendicitis*.

Early voluntary guarding may be replaced by involuntary muscular rigidity.

Right-sided rectal tenderness may also be caused by an inflamed adnexa or an inflamed seminal vesicle.

Rebound tenderness suggests peritoneal inflammation, if *appendicitis*.

Pain in the *right* lower quadrant during *left*-sided pressure suggests *appendicitis* (a positive Rovsing's sign). So does right lower quadrant pain on quick withdrawal (*referred rebound tenderness*).

Increased abdominal pain on either maneuver constitutes a *positive psoas sign*, suggesting irritation of the psoas muscle by an inflamed appendix.

Right hypogastric pain constitutes a *positive obturator sign*, suggesting irritation of the obturator muscle by an inflamed appendix.

Localized pain with this maneuver, in all or part of the right lower quadrant, may accompany *appendicitis*.

Assessing Possible Acute Cholecystitis

When right upper quadrant pain and tenderness suggest acute cholecystitis, look for *Murphy's sign*. Hook your left thumb or the fingers of your right hand under the costal margin at the point where the lateral border of the rectus muscle intersects with the costal margin. Alternatively, if the liver is enlarged, hook your thumb or fingers under the liver edge at a comparable point below. Ask the patient to take a deep breath. Watch the patient's breathing and note the degree of tenderness.

Assessing Ventral Hernias

Ventral hernias are hernias in the abdominal wall exclusive of groin hernias. If you suspect but do not see an umbilical or incisional hernia, ask the patient to raise both head and shoulders off the table.

Inguinal and femoral hernias are discussed in Chapter 13, Male Genitalia and Hernias. They can give rise to important abdominal problems and must not be overlooked.

Mass in the Abdominal Wall

Distinguishing an Abdominal Mass From a Mass in the Abdominal Wall. An occasional mass is in the abdominal wall rather than inside the abdominal cavity. Ask the patient either to raise the head and shoulders or to strain down, thus tightening the abdominal muscles. Feel for the mass again.

A sharp increase in tenderness with a sudden stop in inspiratory effort constitutes a *positive Murphy's sign of acute cholecystitis*. Hepatic tenderness may also increase with this maneuver but is usually less well localized.

The bulge of a hernia will usually appear with this action (see p. 511).

The cause of intestinal obstruction or peritonitis may be missed by overlooking a strangulated femoral hernia.

A mass in the abdominal wall remains palpable; an intra-abdominal mass is obscured by muscular contraction.

RECORDING YOUR FINDINGS

Note that initially you may use sentences to describe your findings; later you will use phrases. The style below contains phrases appropriate for most write-ups.

Recording the Physical Examination—The Abdomen

"Abdomen is protuberant with active bowel sounds. It is soft and non-tender; no palpable masses or hepatosplenomegaly. Liver span is 7 cm in the right midclavicular line; edge is smooth and palpable 1 cm below the right costal margin. Spleen and kidneys not felt. No costovertebral angle (CVA) tenderness."

OR

"Abdomen is flat. No bowel sounds heard. It is firm and boardlike, with increased tenderness, guarding, and rebound in the right midquadrant. Liver percusses to 7 cm in the midclavicular line; edge not felt. Spleen and kidneys not felt. No palpable masses. No CVA tenderness.

Suggests peritonitis from possible *appendicitis* (see p. 450 and pp. 450–458)

BIBLIOGRAPHY

CITATIONS

1. Hing E, Cherry DK, Woodwell DA. National ambulatory medical care survey: 2004 summary. *Advance Data from Vital and Health Statistics* 374. June 23, 2006. Centers for Disease Control and Prevention. Available at: <http://www.cdc.gov/nchs/data/ad/ad374.pdf>. Accessed September 23, 2007.
2. McCaig LF, Burt CW. National hospital ambulatory medical care survey: 2003 emergency department summary. *Advance Data from Vital and Health Statistics* 358. May 26, 2005. Centers for Disease Control and Prevention. Available at: <http://www.cdc.gov/nchs/data/ad/ad358.pdf>. Accessed September 23, 2007.
3. Talley NJ, Vakil NB, Moayyedi P, et al. American Gastroenterological Association technical review on the evaluation of dyspepsia. *Gastroenterology* 129(5):1756–1780, 2005.
4. Drossman DA. The functional gastrointestinal disorders and the Rome III process. *Gastroenterology* 130(5):1377–1390, 2007.
5. Ranji SR, Goldman LE, Simel DL, et al. Do opiates affect the clinical evaluation of patients with acute abdominal pain? *JAMA* 296(14):1764–1774, 2006.
6. Whitcomb DC. Acute pancreatitis. *N Engl J Med* 354(20):2142–2150, 2006.
7. Trowbridge RL, Rutkowschi NK, Shojania KG. Does this patient have acute cholecystitis? *JAMA* 289(1):80–86, 2003.
8. Talley NJ, Vakil N. Practice guidelines: guidelines for management of dyspepsia. *Am J Gastroenterol* 100(10):2324–2337, 2005.
9. DeVault KR, Castell DO. Updated guidelines for the diagnosis and treatment of gastroesophageal reflux disease. *Am J Gastroenterol* 100(1):190–200, 2005.
10. Vaezi MF, Hicks DM, Abelson TI, et al. Laryngeal signs and symptoms and gastroesophageal reflux disease (GERD): a critical assessment of cause and effect association. *Gastroenterol Hepatol* 1(5):333–344, 2003.
11. Talley NJ. American Gastroenterological Association medical position statement: evaluation of dyspepsia. *Gastroenterology* 129(5):1753–1755, 2005.
12. Shaheen N, Ransohoff DF. Gastroesophageal reflux, Barrett esophagus, and esophageal cancer. Scientific review. *JAMA* 287(15):1972–1981, 2002.
13. Moayyedi P, Talley NJ, Fennerty MB, et al. Can the clinical history distinguish between organic and functional dyspepsia? *JAMA* 295(13):1566–1576, 2006.
14. Paulson EK, Kalady MF, Pappas TN. Suspected appendicitis. *N Engl J Med* 348(3):236–242, 2003.
15. Horwitz BJ, Fisher RS. The irritable bowel syndrome. *N Engl J Med* 344(24):1846–1850, 2001.
16. Theilman NM, Guerrant RL. Acute infectious diarrhea. *N Engl J Med* 350(1):38–46, 2004.
17. Longstreth GF, Thompson WG, Chey WD, et al. Functional bowel disorders. *Gastroenterology* 130(5):1480–1491, 2006. Available at: <http://www.romecriteria.org/pdfs/p1480FBDs.pdf>. Accessed October 5, 2007.
18. Grant BF, Dawson DA, Stinson FS, et al. The 12-month prevalence and trends in DSM-IV alcohol abuse and dependence: United States, 1991–1992 and 2001–2002. *Drug and Alcohol Dependence* 74(3):223–234, 2004.
19. Regier DA, Farmer ME, Rae DS, et al. Comorbidity of mental disorders with alcohol and other drug abuse: results from the Epidemiologic Catchment Study. *JAMA* 264(19):2511–2518, 1990.
20. Saitz R. Unhealthy alcohol use. *N Engl J Med* 352(6):596–607, 2005.
21. U.S. Preventive Services Task Force. Screening and Behavioral Counseling Interventions in Primary Care to Reduce Alcohol Misuse: Recommendation Statement. Rockville, MD, Agency for Healthcare Research and Quality, April 2004. Updated in *Guide to Clinical Preventive Services*, 2006. Available at: <http://www.ahrq.gov/clinic/pocketgd/gcps2c.htm#Alcohol>. Accessed September 6, 2007.
22. U.S. Preventive Services Task Force. Screening for hepatitis B infection; Screening for hepatitis C in adults. *Guide to Clinical Preventive Services*, 2006. Available at: <http://www.ahrq.gov/clinic/pocketgd/gcps2b.htm#HepB>. Accessed October 14, 2007.
23. Fiore AF, Wasley A, Bell BP. Recommendations of the Advisory Committee on Immunization Practices: prevention of hepatitis A through active or passive immunization. *MMWR Morb Mortal Wkly Rep* 55(RR07):1–23, 2006. Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5507al.htm>. Accessed October 14, 2007.
24. Mast E, Weinbaum CM, Fiore AE, et al. Recommendations of the Advisory Committee on Immunization Practices. Part II: Immunization of adults. A comprehensive immunization strategy to eliminate transmission of hepatitis B virus infection in the United States. *MMWR Morb Mortal Wkly Rep* 55(RR16):1–25, 2006. Available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5516a1.htm?s_cid=rr5516a1_e. Accessed October 14, 2007.
25. Centers for Disease Control and Prevention. National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention. Hepatitis C Fact Sheet. May 24, 2005. Available at: <http://www.cdc.gov/ncidod/diseases/hepatitis/c/fact.htm>. Accessed October 14, 2007.
26. American Cancer Society. *Cancer Facts and Figures 2007*. Atlanta, National Home Office. Available at: <http://www.cancer.org/downloads/STT/CAFF2007PWSecured.pdf>. Accessed October 14, 2007.
27. Winawer S, Fletcher R, Rex D, et al. Gastrointestinal Consortium Panel. Colorectal cancer screening and surveillance: clinical guidelines and rationale. Update based on new evidence. *Gastroenterology* 124(2):544–560, 2003.
28. Winawer S, Zauber A, Fletcher RH, et al. Guidelines for colonoscopy surveillance after polypectomy: a consensus update by the US Multi-Society Task Force on Colorectal Cancer and the American Cancer Society. *Gastroenterology* 130(6):1872–1885, 2006.
29. Collins JF, Leiberman DA, Dirbom TE, et al. Accuracy of screening for fecal occult blood on a single stool sample obtained by digital rectal examination: a comparison with

- recommended sampling practice. *Ann Intern Med* 142(2): 81–85, 2005.
30. Boolchand V, Olds G, Singh J, et al. Colorectal screening after polypectomy: a national survey study of primary care physicians. *Ann Intern Med* 145(9):654–659, 2006.
 31. American Cancer Society. What are the risk factors for colorectal cancer? Available at: http://www.cancer.org/docroot/CRI/content/CRI_2_4_2X_What_are_the_risk_factors_for_colon_and_rectum_cancer.asp?sitearea=CRI&viewmode=print&. Accessed October 14, 2007.
 32. American Cancer Society. Can colorectal polyps and cancer be found early? Available at: http://www.cancer.org/docroot/CRI/content/CRI_2_4_3X_Can_colon_and_rectum_cancer_be_found_early.asp. Accessed October 14, 2007.
 33. Schatzkin A, Lanza E, Corle D, et al. Lack of effect of a low-fat, high-fiber diet on the recurrence of colorectal adenomas. *N Engl J Med* 342(16):1149–1155, 2000.
 34. Alberts DS, Martinez ME, Roe DJ, et al. Lack of effect of a high-fiber cereal supplement on the recurrence of colorectal adenomas. *N Engl J Med* 342(16):1156–1162, 2000.
 35. U.S. Preventive Services Task Force. Routine aspirin or non-steroidal anti-inflammatory drugs for the primary prevention of colorectal cancer: U.S. Preventive Services Task Force Recommendation Statement. *Ann Intern Med* 146(5):361–364, 2007.
 36. McGee S. Chapter 47, Palpation and percussion of the abdomen; Chapter 48, Abdominal pain and tenderness. In *Evidence-Based Physical Diagnosis*. St. Louis, Saunders, 2007, pp. 553–555, 572–582.
 37. Naylor CD. Physical examination of the liver. *JAMA* 271(23): 1857–1859, 1994.
 38. Grover SA, Barkun AN, Sackett DL. Does this patient have splenomegaly? *JAMA* 270(18):2218–2221, 1993.
 39. U.S. Preventive Services Task Force. Screening for abdominal aortic aneurysm: recommendation statement. *Ann Intern Med* 142(3):198–202, 2005.
 40. Birkmeyer JD, Upchurch GR. Evidence-based screening and management of abdominal aortic aneurysm (editorial). *Ann Intern Med* 146(10): 749–750, 2007.
 41. Lederle FA, Simel DL. Does this patient have abdominal aortic aneurysm? *JAMA* 281(1):77–82, 1999.
 42. Williams JW, Simel DL. Does this patient have ascites? How to divine fluid in the abdomen. *JAMA* 267(19):2645–2648, 1992.

ADDITIONAL REFERENCES

Examination of the Abdomen

- Fink HA, Lederle FA, Rptj CS. The accuracy of physical examination to detect abdominal aortic aneurysm. *Arch Intern Med* 160(6):833–836, 2000.
- Kim LG, Scott AP, Ashton HA, et al. A sustained mortality benefit from screening for abdominal aortic aneurysm. *Ann Intern Med* 146(10): 696–706, 2007.
- McGee SR. Percussion and physical diagnosis: separating myth from science. *Dis Mon* 41(10):641–688, 1995.
- Silen W, Cope Z. *Cope's Early Diagnosis of the Acute Abdomen*, 21st ed. Oxford, UK, and New York, Oxford University Press, 2005.

Sleisenger MH, Feldman M, Griedman LS, et al (eds). *Sleisenger and Fortran's Gastrointestinal and Liver Disease: Pathophysiology, Diagnosis, Management*, 8th ed. Philadelphia, WB Saunders, 2006.

Turnbull JM. Is listening for abdominal bruits useful in the evaluation of hypertension? *JAMA* 274(16):1299–1301, 1995.

Yamamoto W, Kono H, Maekawa H, et al. The relationship between abdominal pain regions and specific diseases: an epidemiologic approach to clinical practice. *J Epidemiol* 7(1):27–32, 1997.

Examination of the Liver

Meidl EJ, Ende J. Evaluation of liver size by physical examination. *J Gen Intern Med* 8(11):635–637, 1993.

Zoli M, Magliotti D, Drimaldi M, et al. Physical examination of the liver: is it still worth it? *Am J Gastroenterol* 90(9):1428–1432, 1995.

Examination of the Spleen

Barkun ANB, Camus M, Green L, et al. The bedside assessment of splenic enlargement. *Am J Med* 91(5):512–518, 1991.

Barkun AN, Camus M, Meagher T, et al. Splenic enlargement and Traube's space: how useful is percussion? *Am J Med* 87(5): 562–566, 1989.

Tamayo SG, Rickman LS, Matthews WC, et al. Examiner dependence on physical diagnostic tests of splenomegaly: a prospective study with multiple observers. *J Gen Intern Med* 8(2):69–75, 1993.

Gastrointestinal Conditions

American Gastroenterological Association. American Gastroenterological Association Medical Position Statement: guidelines on constipation. *Gastroenterology* 119(6):1761–1778, 2000.

Bak E, Raman G, Chung M, et al. Effectiveness of management strategies for renal artery stenosis: a systematic review. *Ann Intern Med* 145(12):901–912, 2006.

Craig AS, Schaffner W. Prevention of hepatitis A with the hepatitis A vaccine. *N Engl J Med* 350(5):476–480, 2004.


Lembo A, Camilleri M. Chronic constipation. *N Engl J Med* 349(14):1360–1368, 2003.

Mertz HR. Irritable bowel syndrome. *N Engl J Med* 349(22): 2136–2146, 2003.

Ouslander JG. Management of the overactive bladder. *N Engl J Med* 350(8):786–799, 2004.

Shaheen N, Ransohoff DF. Gastroesophageal reflux, Barrett esophagus, and esophageal cancer: clinical applications. *JAMA* 287(15): 1982–1986, 2002.

Thielman NM, Guerrant RL. Acute infectious diarrhea. *N Engl J Med* 350(1):38–47, 2004.

 **The Bates' suite offers these additional resources to enhance learning and facilitate understanding of this chapter:**

- *Bates' Pocket Guide to Physical Examination and History Taking*, 6th edition
- *Bates' Nursing Online*
- *Bates' Visual Guide to Physical Examination*, 4th edition
- thePoint online resources, <http://thepoint.lww.com>
- Student CD-ROM included with the book

Abdominal Pain

Problem	Process	Location	Quality
Peptic Ulcer and Dyspepsia ^{3,4}	Peptic ulcer refers to a demonstrable ulcer, usually in the duodenum or stomach. Dyspepsia causes similar symptoms but no ulceration. Infection by <i>Helicobacter pylori</i> is often present.	Epigastric, may radiate to the back	Variable: gnawing burning, boring, aching, pressing, or hungerlike
Cancer of the Stomach	Predominantly adenocarcinoma (90%–95%)	Increasingly in ‘cardia’ and GE junction; also in distal stomach	Variable
Acute Pancreatitis ⁶	An acute inflammation of the pancreas	Epigastric, may radiate to the back or other parts of the abdomen; may be poorly localized	Usually steady
Chronic Pancreatitis	Fibrosis of the pancreas secondary to recurrent inflammation	Epigastric, radiating through to the back	Steady, deep
Cancer of the Pancreas	Predominantly adenocarcinoma (95%)	Epigastric and in either upper quadrant; often radiates to the back	Steady, deep
Biliary Colic	Sudden obstruction of the cystic duct or common bile duct by a gallstone	Epigastric or right upper quadrant; may radiate to the right scapula and shoulder	Steady, aching; <i>not</i> colicky
Acute Cholecystitis ⁷	Inflammation of the gallbladder, usually from obstruction of the cystic duct by a gallstone	Right upper quadrant or upper abdominal; may radiate to the right scapular area	Steady, aching
Acute Diverticulitis	Acute inflammation of a colonic diverticulum, a saclike mucosal outpouching through the colonic muscle	Left lower quadrant	May be cramping at first, but becomes steady
Acute Appendicitis ¹⁴	Acute inflammation of the appendix with distention or obstruction	<ul style="list-style-type: none"> • Poorly localized <i>periumbilical pain</i>, followed usually by • <i>Right lower quadrant pain</i> 	<ul style="list-style-type: none"> • Mild but increasing, possibly cramping • Steady and more severe
Acute Mechanical Intestinal Obstruction	Obstruction of the bowel lumen, most commonly caused by (1) adhesions or hernias (small bowel), or (2) cancer or diverticulitis (colon)	<ul style="list-style-type: none"> • <i>Small bowel</i>: periumbilical or upper abdominal • <i>Colon</i>: lower abdominal or generalized 	<ul style="list-style-type: none"> • Cramping • Cramping
Mesenteric Ischemia	Blood supply to the bowel and mesentery blocked from thrombosis or embolus (acute arterial occlusion), or reduced from hypoperfusion	May be periumbilical at first, then diffuse	Cramping at first, then steady

Timing	Factors That May Aggravate	Factors That May Relieve	Associated Symptoms and Setting
Intermittent. Duodenal ulcer is more likely than gastric ulcer or dyspepsia to cause pain that (1) wakes the patient at night, and (2) occurs intermittently over a few weeks, then disappears for months, and then recurs.	Variable	Food and antacids may bring relief, but not necessarily in any of these disorders and least commonly in gastric ulcer.	Nausea, vomiting, belching, bloating; heartburn (more common in duodenal ulcer); weight loss (more common in gastric ulcer). Dyspepsia is more common in the young (20–29 yrs), gastric ulcer in those over 50 yrs, and duodenal ulcer in those 30–60 yrs.
The history of pain is typically shorter than in peptic ulcer. The pain is persistent and slowly progressive.	Often food	<i>Not</i> relieved by food or antacids	Anorexia, nausea, early satiety, weight loss, and sometimes bleeding. Most common in ages 50–70
Acute onset, persistent pain	Lying supine	Leaning forward with trunk flexed	Nausea, vomiting, abdominal distention, fever. Often a history of previous attacks and alcohol abuse or gallstones
Chronic or recurrent course	Alcohol, heavy or fatty meals	Possibly leaning forward with trunk flexed; often intractable	Symptoms of decreased pancreatic function may appear: diarrhea with fatty stools (steatorrhea) and diabetes mellitus.
Persistent pain; relentlessly progressive illness		Possibly leaning forward with trunk flexed; often intractable	Anorexia, nausea, vomiting, weight loss, and jaundice; depression
Rapid onset over a few minutes, lasts one to several hours and subsides gradually. Often recurrent			Anorexia, nausea, vomiting, restlessness
Gradual onset; course longer than in biliary colic	Jarring, deep breathing		Anorexia, nausea, vomiting, fever
Often a gradual onset			Fever, constipation. There may be initial brief diarrhea.
<ul style="list-style-type: none"> • Lasts roughly 4–6 hours • Depends on intervention • Paroxysmal; may decrease as bowel mobility is impaired • Paroxysmal, though typically milder 	<ul style="list-style-type: none"> • Movement or cough 	<ul style="list-style-type: none"> • If it subsides temporarily, suspect perforation of the appendix. 	<ul style="list-style-type: none"> • Anorexia, nausea, possibly vomiting, which typically follow the onset of pain; low fever • Vomiting of bile and mucus (high obstruction) or fecal material (low obstruction). Obstipation develops. • Obstipation early. Vomiting late if at all. Prior symptoms of underlying cause.
Usually abrupt in onset, then persistent			Vomiting, diarrhea (sometimes bloody), constipation, shock

Dysphagia

Process and Problem	Timing	Factors That Aggravate	Factors That Relieve	Associated Symptoms and Conditions
Oropharyngeal Dysphagia, due to motor disorders affecting the pharyngeal muscles	Acute or gradual onset and a variable course, depending on the underlying disorder	Attempts to start the swallowing process		Aspiration into the lungs or regurgitation into the nose with attempts to swallow. Neurologic evidence of stroke, bulbar palsy, or other neuromuscular conditions
Esophageal Dysphagia <i>Mechanical Narrowing</i>				
• Mucosal rings and webs	Intermittent	Solid foods	Regurgitation of the bolus of food	Usually none
• Esophageal stricture	Intermittent; may become slowly progressive	Solid foods	Regurgitation of the bolus of food	A long history of heartburn and regurgitation
• Esophageal cancer	May be intermittent at first; progressive over months	Solid foods, with progression to liquids	Regurgitation of the bolus of food	Pain in the chest and back and weight loss, especially late in the course of illness
Motor Disorders				
• Diffuse esophageal spasm	Intermittent	Solids or liquids	Maneuvers described below; sometimes nitroglycerin	Chest pain that mimics angina pectoris or myocardial infarction and lasts minutes to hours; possibly heartburn
• Scleroderma	Intermittent; may progress slowly	Solids or liquids	Repeated swallowing; movements such as straightening the back, raising the arms, or a Valsalva maneuver (straining down against a closed glottis)	Heartburn; other manifestations of scleroderma
• Achalasia	Intermittent; may progress	Solids or liquids		Regurgitation, often at night when lying down, with nocturnal cough; possibly chest pain precipitated by eating

Constipation

Problem	Process	Associated Symptoms and Setting
<p>Life Activities and Habits <i>Inadequate Time or Setting for the Defecation Reflex</i></p>	Ignoring the sensation of a full rectum inhibits the defecation reflex.	Hectic schedules, unfamiliar surroundings, bed rest
<i>False Expectations of Bowel Habits</i>	Expectations of “regularity” or more frequent stools than a person’s norm	Beliefs, treatments, and advertisements that promote the use of laxatives
<i>Diet Deficient in Fiber</i>	Decreased fecal bulk	Other factors such as debilitation and constipating drugs may contribute.
<p>Irritable Bowel Syndrome¹⁵</p>	Change in frequency or form of bowel movement without structural or chemical abnormality	Small, hard stools, often with mucus; periods of diarrhea; intermittent pain for 12 weeks of preceding 12 months, relieved by defecation; stress may aggravate.
<p>Mechanical Obstruction <i>Cancer of the Rectum or Sigmoid Colon</i></p>	Progressive narrowing of the bowel lumen	Change in bowel habits; often diarrhea, abdominal pain, and bleeding. In rectal cancer, tenesmus and pencil-shaped stools
<i>Fecal Impaction</i>	A large, firm, immovable fecal mass, most often in the rectum	Rectal fullness, abdominal pain, and diarrhea around the impaction; common in debilitated, bedridden, and often elderly patients
<i>Other Obstructing Lesions (such as diverticulitis, volvulus, intussusception, or hernia)</i>	Narrowing or complete obstruction of the bowel	Colicky abdominal pain, abdominal distention, and in intussusception, often “currant jelly” stools (red blood and mucus)
Painful Anal Lesions	Pain may cause spasm of the external sphincter and voluntary inhibition of the defecation reflex.	Anal fissures, painful hemorrhoids, perirectal abscesses
Drugs	A variety of mechanisms	Opiates, anticholinergics, antacids containing calcium or aluminum, and many others
Depression	A disorder of mood. See Table 5-2, Disorders of Mood.	Fatigue, anhedonia, sleep disturbance, weight loss
Neurologic Disorders	Interference with the autonomic innervation of the bowel	Spinal cord injuries, multiple sclerosis, Hirschsprung’s disease, and other conditions
Metabolic Conditions	Interference with bowel motility	Pregnancy, hypothyroidism, hypercalcemia

Diarrhea

Problem	Process	Characteristics of Stool
Acute Diarrhea ¹⁶ <i>Secretory Infection</i>	Infection by viruses, preformed bacterial toxins (such as <i>Staphylococcus aureus</i> , <i>Clostridium perfringens</i> , toxigenic <i>Escherichia coli</i> , <i>Vibrio cholerae</i>), cryptosporidium, <i>Giardia lamblia</i>	Watery, without blood, pus, or mucus
<i>Inflammatory Infection</i>	Colonization or invasion of intestinal mucosa (nontyphoid <i>Salmonella</i> , <i>Shigella</i> , <i>Yersinia</i> , <i>Campylobacter</i> , enteropathic <i>E. coli</i> , <i>Entamoeba histolytica</i>)	Loose to watery, often with blood, pus, or mucus
Drug-Induced Diarrhea	Action of many drugs, such as magnesium-containing antacids, antibiotics, antineoplastic agents, and laxatives	Loose to watery
Chronic Diarrhea <i>Diarrheal Syndrome</i>		
• Irritable bowel syndrome ¹⁵	Change in frequency and form of bowel movements without chemical or structural abnormality	Loose; may show mucus but no blood. Small, hard stools with constipation
• Cancer of the sigmoid colon	Partial obstruction by a malignant neoplasm	May be blood-streaked
<i>Inflammatory Bowel Disease</i>		
• Ulcerative colitis	Inflammation of the mucosa and submucosa of the rectum and colon with ulceration; typically extends proximally from the rectum	Soft to watery, often containing blood
• Crohn's disease of the small bowel (regional enteritis) or colon (granulomatous colitis)	Chronic transmural inflammation of the bowel wall, in a skip pattern typically involving the terminal ileum and/or proximal colon	Small, soft to loose or watery, usually free of gross blood (enteritis) or with less bleeding than ulcerative colitis (colitis)
<i>Voluminous Diarrhea</i>		
• Malabsorption syndrome	Defective absorption of fat, including fat-soluble vitamins, with steatorrhea (excessive excretion of fat) as in pancreatic insufficiency, bile salt deficiency, bacterial overgrowth	Typically bulky, soft, light yellow to gray, mushy, greasy or oily, and sometimes frothy; particularly foul-smelling; usually floats in the toilet
• Osmotic diarrhea		
Lactose intolerance	Deficiency in intestinal lactase	Watery diarrhea of large volume
Abuse of osmotic purgatives	Laxative habit, often surreptitious	Watery diarrhea of large volume
• Secretory diarrhea from bacterial infection, secreting villous adenoma, fat or bile salt malabsorption, hormone-mediated conditions (gastrin in Zollinger–Ellison syndrome, vasoactive intestinal peptide)	Variable	Watery diarrhea of large volume

Timing	Associated Symptoms	Setting, Persons at Risk
Duration of a few days, possibly longer. Lactase deficiency may lead to a longer course.	Nausea, vomiting, periumbilical cramping pain. Temperature normal or slightly elevated	Often travel, a common food source, or an epidemic
An acute illness of varying duration	Lower abdominal cramping pain and often rectal urgency, tenesmus; fever	Travel, contaminated food or water. Men and women who have had frequent anal intercourse.
Acute, recurrent, or chronic	Possibly nausea; usually little if any pain	Prescribed or over-the-counter medications
Often worse in the morning Diarrhea rarely wakes the patient at night.	Crampy lower abdominal pain, abdominal distention, flatulence, nausea, constipation	Young and middle-aged adults, especially women
Variable	Change in usual bowel habits, crampy lower abdominal pain, constipation	Middle-aged and older adults, especially older than 55 yrs
Onset ranges from insidious to acute. Typically recurrent; may be persistent. Diarrhea may wake the patient at night.	Crampy lower or generalized abdominal pain, anorexia, weakness; fever if severe. May include episcleritis, uveitis, arthritis, erythema nodosum.	Often young people. Increases risk of colon cancer.
Insidious onset; chronic or recurrent. Diarrhea may wake the patient at night.	Crampy periumbilical or right lower quadrant (enteritis) or diffuse (colitis) pain, with anorexia, low fever, and/or weight loss. Perianal or perirectal abscesses and fistulas. May cause small or large bowel obstruction	Often young people, especially in late teens, but also in middle age. More common in people of Jewish descent. Increases risk of colon cancer
Onset of illness typically insidious	Anorexia, weight loss, fatigue, abdominal distention, often crampy lower abdominal pain. Symptoms of nutritional deficiencies such as bleeding (vitamin K), bone pain and fractures (vitamin D), glossitis (vitamin B), and edema (protein)	Variable, depending on cause
Follows the ingestion of milk and milk products; relieved by fasting	Crampy abdominal pain, abdominal distention, flatulence	In >50% of African-Americans, Asians, Native Americans, Hispanics; in 5%–20% of Caucasians
Variable	Often none	Persons with anorexia nervosa or bulimia nervosa
Variable	Weight loss, dehydration, nausea, vomiting, and cramping abdominal pain	Variable depending on cause

Black and Bloody Stools

Problem	Selected Causes	Associated Symptoms and Setting
<p>Melena</p> <p>Refers to passage of black, tarry (sticky and shiny) stools. Tests for occult blood are positive. Involves loss of at least 60 ml of blood into the gastrointestinal tract (less in infants and children), usually from the esophagus, stomach, or duodenum. Less commonly, when intestinal transit is slow, blood may originate in the jejunum, ileum, or ascending colon. In infants, melena may result from swallowing blood during the birth process.</p>	<p>Peptic ulcer</p> <p>Gastritis or stress ulcers</p> <p>Esophageal or gastric varices</p> <p>Reflux esophagitis Mallory-Weiss tear, a mucosal tear in the esophagus due to retching and vomiting</p>	<p>Often, but not necessarily, a history of epigastric pain</p> <p>Recent ingestion of alcohol, aspirin, or other anti-inflammatory drugs; recent bodily trauma, severe burns, surgery, or increased intracranial pressure</p> <p>Cirrhosis of the liver or other cause of portal hypertension</p> <p>History of heartburn</p> <p>Retching, vomiting, often recent ingestion of alcohol</p>
<p>Black, Nonsticky Stools</p> <p>May result from other causes, then give negative results when tested for occult blood. (Ingestion of iron or other substances, however, may cause a positive test result in the absence of blood.) These stools have no pathologic significance.</p>	<p>Ingestion of iron, bismuth salts as in Pepto-Bismol, licorice, or even commercial chocolate cookies</p>	
<p>Red Blood in the Stools</p> <p>Usually originates in the colon, rectum, or anus, and much less frequently in the jejunum or ileum. Upper gastrointestinal hemorrhage may also cause red stools. The amount of blood lost is then usually large (more than a liter). Rapid transit time through the intestinal tract leaves insufficient time for the blood to turn black.</p>	<p>Cancer of the colon</p> <p>Benign polyps of the colon</p> <p>Diverticula of the colon</p> <p>Inflammatory conditions of the colon and rectum</p> <ul style="list-style-type: none"> • Ulcerative colitis, Crohn's disease • Infectious diarrhea • Proctitis (various causes) from frequent anal intercourse <p>Ischemic colitis</p> <p>Hemorrhoids</p> <p>Anal fissure</p>	<p>Often a change in bowel habits</p> <p>Often no other symptoms</p> <p>Often no other symptoms</p> <p>See Table 11-4, Diarrhea.</p> <p>See Table 11-4, Diarrhea. Rectal urgency, tenesmus</p> <p>Lower abdominal pain, sometimes fever or shock in older adults. Abdomen typically soft to palpation</p> <p>Blood on the toilet paper, on the surface of the stool, or dripping into the toilet</p> <p>Blood on the toilet paper or on the surface of the stool; anal pain</p>
<p>Reddish but Nonbloody Stools</p>	<p>Ingestion of beets</p>	<p>Pink urine, which usually precedes the reddish stool</p>

Frequency, Nocturia, and Polyuria

Problem	Mechanisms	Selected Causes	Associated Symptoms
Frequency	<p>Decreased capacity of the bladder</p> <ul style="list-style-type: none"> Increased bladder sensitivity to stretch because of inflammation Decreased elasticity of the bladder wall Decreased cortical inhibition of bladder contractions <p>Impaired emptying of the bladder, with residual urine in the bladder</p> <ul style="list-style-type: none"> Partial mechanical obstruction of the bladder neck or proximal urethra Loss of peripheral nerve supply to the bladder 	<p><i>Infection</i>, stones, tumor, or foreign body in the bladder</p> <p>Infiltration by scar tissue or tumor</p> <p>Motor disorders of the central nervous system, such as a stroke</p> <p>Most commonly, benign prostatic hyperplasia; also urethral stricture and other obstructive lesions of the bladder or prostate</p> <p>Neurologic disease affecting the sacral nerves or nerve roots, e.g., diabetic neuropathy</p>	<p>Burning on urination, urinary urgency, sometimes gross hematuria</p> <p>Symptoms of associated inflammation (see above) are common.</p> <p>Urinary urgency; neurologic symptoms such as weakness and paralysis</p> <p>Prior obstructive symptoms: hesitancy in starting the urinary stream, straining to void, reduced size and force of the stream, and dribbling during or at the end of urination</p> <p>Weakness or sensory defects</p>
Nocturia <i>With High Volumes</i>	<p>Most types of polyuria (see p. 428)</p> <p>Decreased concentrating ability of the kidney with loss of the normal decrease in nocturnal urinary output</p> <p>Excessive fluid intake before bedtime</p> <p>Fluid-retaining, edematous states</p> <p>Dependent edema accumulates during the day and is excreted when the patient lies down at night.</p>	<p>Chronic renal insufficiency due to a number of diseases</p> <p>Habit, especially involving alcohol and coffee</p> <p>Congestive heart failure, nephrotic syndrome, hepatic cirrhosis with ascites, chronic venous insufficiency</p>	<p>Possibly other symptoms of renal insufficiency</p> <p>Edema and other symptoms of the underlying disorder. Urinary output during the day may be reduced as fluid reaccumulates in the body. See Table 12-5, Peripheral Causes of Edema.</p>
<i>With Low Volumes</i>	<p>Frequency</p> <p>Voiding while up at night without a real urge, a “pseudo-frequency”</p>	<p>Insomnia</p>	<p>Variable</p>
Polyuria	<p>Deficiency of antidiuretic hormone (diabetes insipidus)</p> <p>Renal unresponsiveness to antidiuretic hormone (nephrogenic diabetes insipidus)</p> <p>Solute diuresis</p> <ul style="list-style-type: none"> Electrolytes, such as sodium salts Nonelectrolytes, such as glucose <p>Excessive water intake</p>	<p>A disorder of the posterior pituitary and hypothalamus</p> <p>A number of kidney diseases, including hypercalcemic and hypokalemic nephropathy; drug toxicity, e.g., from lithium</p> <p>Large saline infusions, potent diuretics, certain kidney diseases</p> <p>Uncontrolled diabetes mellitus</p> <p>Primary polydipsia</p>	<p>Thirst and polydipsia, often severe and persistent; nocturia</p> <p>Thirst and polydipsia, often severe and persistent; nocturia</p> <p>Variable</p> <p>Thirst, polydipsia, and nocturia</p> <p>Polydipsia tends to be episodic. Thirst may not be present. Nocturia is usually absent.</p>

Problem**Mechanisms****Stress Incontinence**

The urethral sphincter is weakened so that transient increases in intra-abdominal pressure raise the bladder pressure to levels that exceed urethral resistance.

In women, often a weakness of the pelvic floor with inadequate muscular support of the bladder and proximal urethra and a change in the angle between the bladder and the urethra. Causes include childbirth and surgery. Local conditions affecting the internal urethral sphincter, such as postmenopausal atrophy of the mucosa and urethral infection, may also contribute.

In men, stress incontinence may follow prostatic surgery.

Urge Incontinence

Detrusor contractions are stronger than normal and overcome the normal urethral resistance. The bladder is typically *small*.

- Decreased cortical inhibition of detrusor contractions from strokes, brain tumors, dementia, and lesions of the spinal cord above the sacral level
- Hyperexcitability of sensory pathways, as in bladder infections, tumors, and fecal impaction
- Deconditioning of voiding reflexes, as in frequent voluntary voiding at low bladder volumes

Overflow Incontinence

Detrusor contractions are insufficient to overcome urethral resistance. The bladder is typically *large*, even after an effort to void.

- Obstruction of the bladder outlet, as in benign prostatic hyperplasia or tumor
- Weakness of the detrusor muscle associated with peripheral nerve disease at the sacral level
- Impaired bladder sensation that interrupts the reflex arc, as from diabetic neuropathy

Functional Incontinence

This is a functional inability to get to the toilet in time because of impaired health or environmental conditions.

Problems in mobility resulting from weakness, arthritis, poor vision, or other conditions. Environmental factors such as an unfamiliar setting, distant bathroom facilities, bed rails, or physical restraints

Incontinence Secondary to Medications

Drugs may contribute to any type of incontinence listed.

Sedatives, tranquilizers, anticholinergics, sympathetic blockers, and potent diuretics

*Patients may have more than one kind of incontinence.

Symptoms

Momentary leakage of small amounts of urine with coughing, laughing, and sneezing while the person is in an upright position. A desire to urinate is not associated with pure stress incontinence.

Incontinence preceded by an urge to void. The volume tends to be moderate.

Urgency

Frequency and nocturia with small to moderate volumes

If acute inflammation is present, pain on urination

Possibly “pseudo-stress incontinence”—voiding 10–20 sec after stresses such as a change of position, going up or down stairs, and possibly coughing, laughing, or sneezing

A continuous dripping or dribbling incontinence

Decreased force of the urinary stream

Prior symptoms of partial urinary obstruction or other symptoms of peripheral nerve disease may be present.

Incontinence on the way to the toilet or only in the early morning

Variable. A careful history and chart review are important.

Physical Signs

The bladder is not detected on abdominal examination.

Stress incontinence may be demonstrable, especially if the patient is examined before voiding and in a standing position.

Atrophic vaginitis may be evident.

The bladder is not detectable on abdominal examination.

When cortical inhibition is decreased, mental deficits or motor signs of central nervous system disease are often, though not necessarily, present.

When sensory pathways are hyperexcitable, signs of local pelvic problems or a fecal impaction may be present.

An enlarged bladder is often found on abdominal examination and may be tender. Other signs include prostatic enlargement, motor signs of peripheral nerve disease, a decrease in sensation (including perineal sensation), and diminished to absent reflexes.

The bladder is not detectable on physical examination. Look for physical or environmental clues to the likely cause.

Variable

Localized Bulges in the Abdominal Wall

Localized bulges in the abdominal wall include *ventral hernias* (defects in the wall through which tissue protrudes) and subcutaneous tumors such as *lipomas*. The more common ventral hernias are umbilical, incisional, and epigastric. Hernias and a rectus diastasis usually become more evident when the patient raises head and shoulders from a supine position.



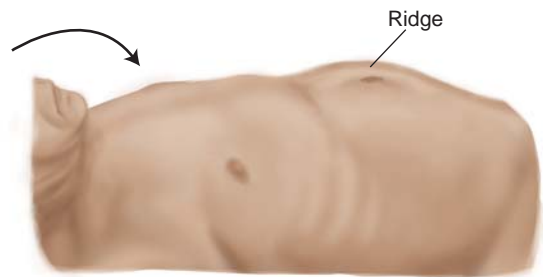
INFANT

Umbilical Hernia

A protrusion through a defective umbilical ring is most common in infants but also occurs in adults. In infants, but not in adults, it usually closes spontaneously within 1 to 2 years.

Diastasis Recti

Separation of the two rectus abdominis muscles, through which abdominal contents form a midline ridge when the patient raises head and shoulders. Often seen in repeated pregnancies, obesity, and chronic lung disease. It has no clinical consequences.



Incisional Hernia

This is a protrusion through an operative scar. Palpate to detect the length and width of the defect in the abdominal wall. A small defect, through which a large hernia has passed, has a greater risk for complications than a large defect.



Epigastric Hernia

A small midline protrusion through a defect in the linea alba occurs between the xiphoid process and the umbilicus. With the patient's head and shoulders raised (or with the patient standing), run your fingerpad down the linea alba to feel it.



Lipoma

Common, benign, fatty tumors usually in the subcutaneous tissues almost anywhere in the body, including the abdominal wall. Small or large, they are usually soft and often lobulated. Press your finger down on the edge of a lipoma. The tumor typically slips out from under it.

Protuberant Abdomens



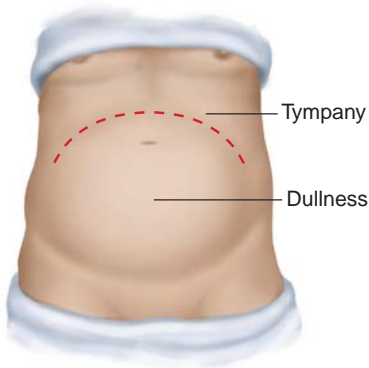
Fat

Fat is the most common cause of a protuberant abdomen. Fat thickens the abdominal wall, the mesentery, and omentum. The umbilicus may appear sunken. A *pannus*, or apron of fatty tissue, may extend below the inguinal ligaments. Lift it to look for inflammation in the skin folds or even for a hidden hernia.



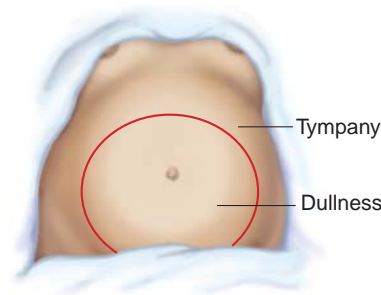
Gas

Gaseous distention may be localized or generalized. It causes a tympanitic percussion note. Increased intestinal gas production from certain foods may cause mild distention. More serious are intestinal obstruction and adynamic (paralytic) ileus. Note the location of the distention. Distention becomes more marked in colonic than in small bowel obstruction.



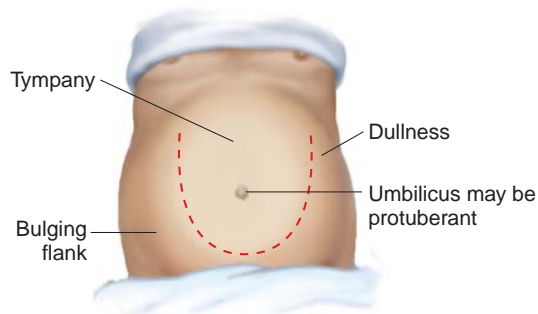
Tumor

A large, solid tumor, usually rising out of the pelvis, is dull to percussion. Air-filled bowel is displaced to the periphery. Causes include ovarian tumors and uterine myomata. Occasionally a markedly distended bladder may be mistaken for such a tumor.



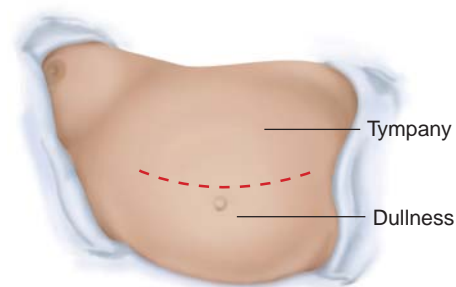
Pregnancy

Pregnancy is a common cause of a pelvic "mass." Listen for the fetal heart (see pp. 885–886).

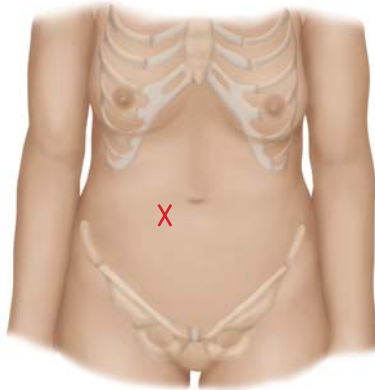


Ascitic Fluid⁴²

Ascitic fluid seeks the lowest point in the abdomen, producing bulging flanks that are dull to percussion. The umbilicus may protrude. Turn the patient onto one side to detect the shift in position of the fluid level (shifting dullness). (See pp. 448–449 for the assessment of ascites.)



Sounds in the Abdomen

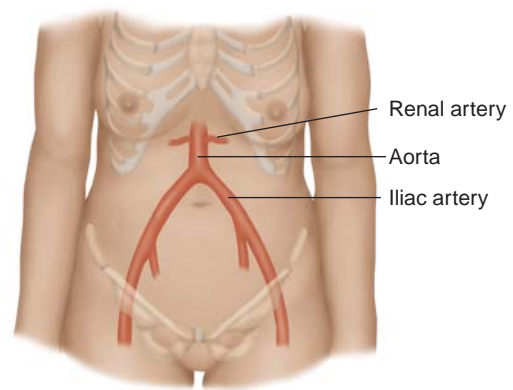


Bowel Sounds

Bowel sounds may be:

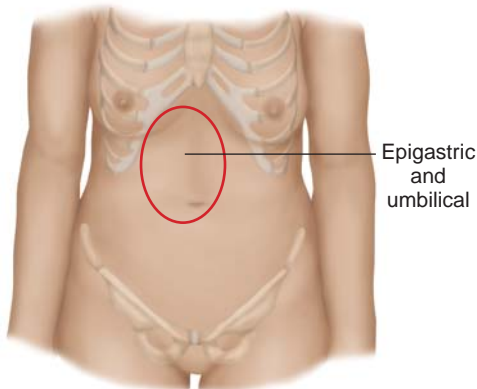
- *Increased*, as in diarrhea or *early intestinal obstruction*
- *Decreased*, then absent, as in *adynamic ileus* and *peritonitis*. Before deciding that bowel sounds are absent, sit down and listen where shown for 2 min or even longer.

High-pitched tinkling sounds suggest intestinal fluid and air under tension in a dilated bowel. *Rushes of high-pitched sounds* coinciding with an abdominal cramp indicate intestinal obstruction.



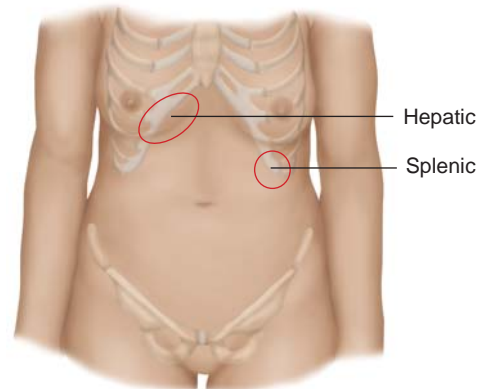
Bruits

A *hepatic bruit* suggests carcinoma of the liver or alcoholic hepatitis. *Arterial bruits* with both systolic and diastolic components suggest partial occlusion of the aorta or large arteries. Partial occlusion of a renal artery may explain hypertension.



Venous Hum

A venous hum is rare. It is a soft humming noise with both systolic and diastolic components. It indicates increased collateral circulation between portal and systemic venous systems, as in hepatic cirrhosis.

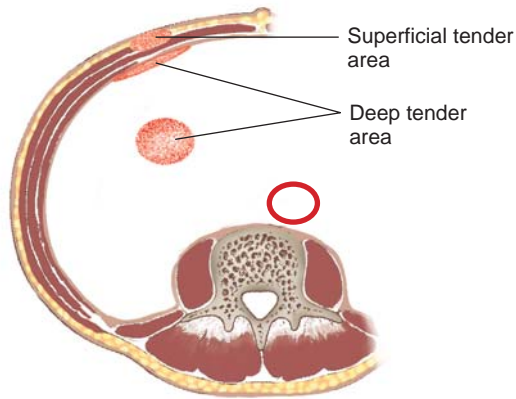


Friction Rubs

Friction rubs are rare. They are grating sounds with respiratory variation. They indicate inflammation of the peritoneal surface of an organ, as in liver cancer, chlamydial or gonococcal perihepatitis, recent liver biopsy, or splenic infarct. When a systolic bruit accompanies a hepatic friction rub, suspect carcinoma of the liver.

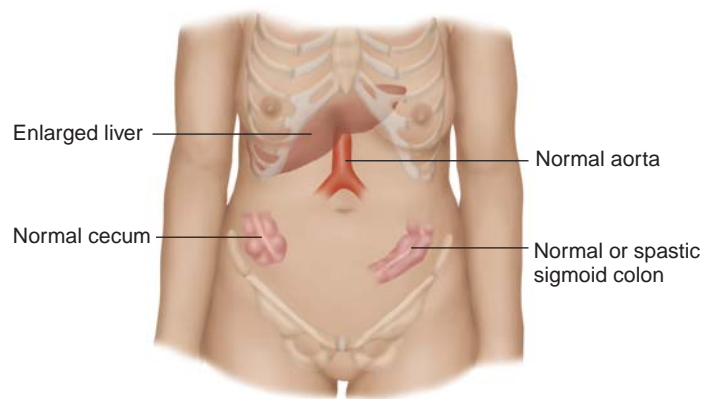
Tender Abdomens

Abdominal Wall Tenderness



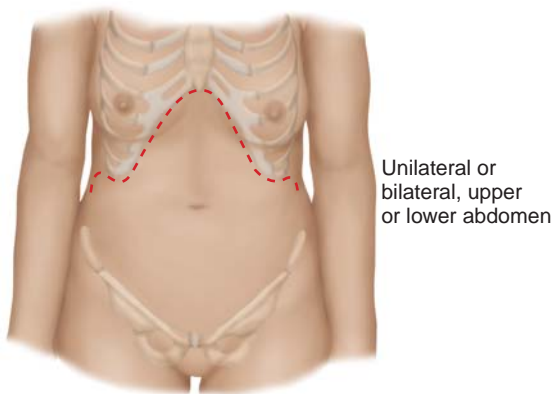
Tenderness may originate in the abdominal wall. When the patient raises the head and shoulders, this tenderness persists, whereas tenderness from a deeper lesion (protected by the tightened muscles) decreases.

Visceral Tenderness



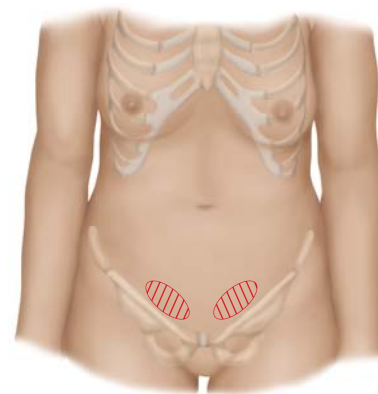
The structures shown may be tender to deep palpation. Usually the discomfort is dull with no muscular rigidity or rebound tenderness. A reassuring explanation to the patient may prove quite helpful.

Tenderness From Disease in the Chest and Pelvis



Acute Pleurisy

Abdominal pain and tenderness may result from acute pleural inflammation. When unilateral, it may mimic acute cholecystitis or appendicitis. Rebound tenderness and rigidity are less common; chest signs are usually present.



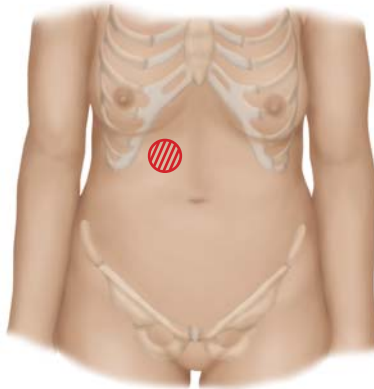
Acute Salpingitis

Frequently bilateral, the tenderness of acute salpingitis (inflammation of the fallopian tubes) is usually maximal just above the inguinal ligaments. Rebound tenderness and rigidity may be present. On pelvic examination, motion of the uterus causes pain.

(table continues on page 468)

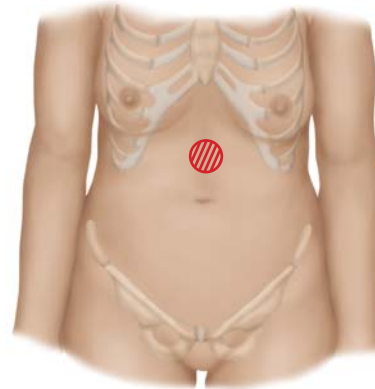
Tenderness of Peritoneal Inflammation

Tenderness associated with peritoneal inflammation is more severe than visceral tenderness. Muscular rigidity and rebound tenderness are frequently but not necessarily present. Generalized peritonitis causes exquisite tenderness throughout the abdomen, together with boardlike muscular rigidity. These signs on palpation, especially abdominal rigidity, double the likelihood of peritonitis.³⁶ Local causes of peritoneal inflammation include:



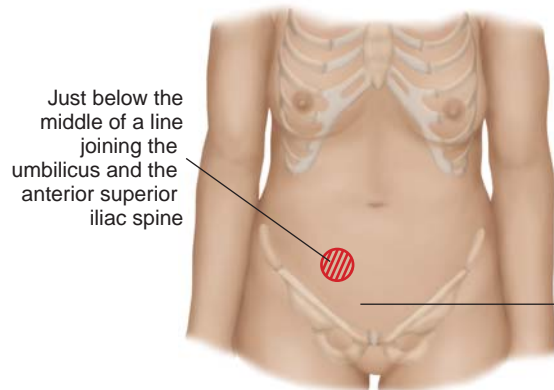
Acute Cholecystitis⁷

Signs are maximal in the right upper quadrant. Check for Murphy's sign (see p. 451).



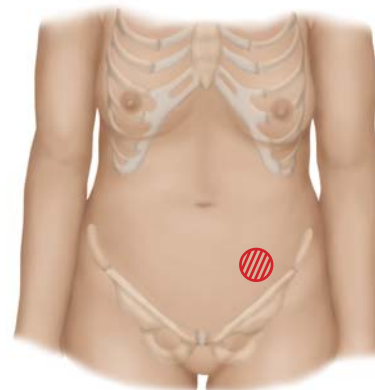
Acute Pancreatitis⁶

In acute pancreatitis, epigastric tenderness and rebound tenderness are usually present, but the abdominal wall may be soft.



Acute Appendicitis¹⁴

Right lower quadrant signs are typical of acute appendicitis but may be absent early in the course. The typical area of tenderness is illustrated. Explore other portions of the right lower quadrant as well as the right flank.

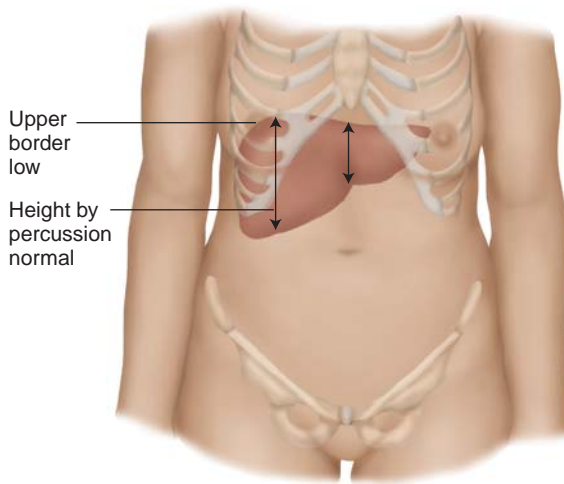


Acute Diverticulitis

Acute diverticulitis most often involves the sigmoid colon and then resembles a left-sided appendicitis.

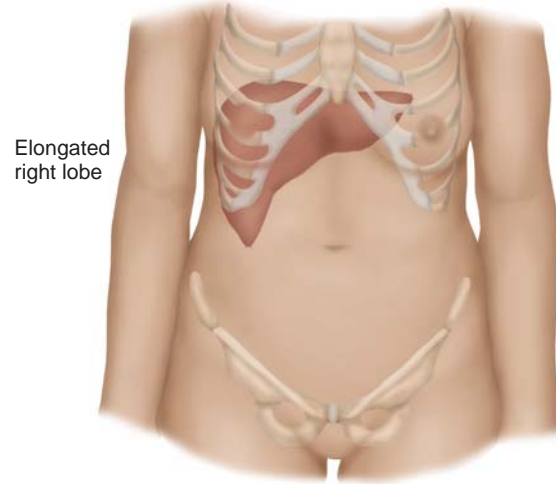
Liver Enlargement: Apparent and Real

A palpable liver does not necessarily indicate hepatomegaly (an enlarged liver), but more often results from a change in consistency—from the normal softness to an abnormal firmness or hardness, as in cirrhosis. Clinical estimates of liver size should be based on both percussion and palpation, although even these techniques are far from perfect.³⁶



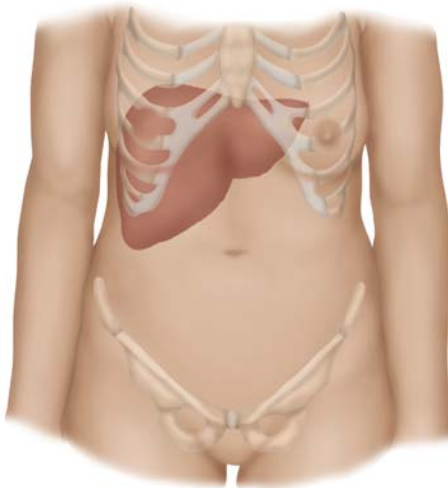
Downward Displacement of the Liver by a Low Diaphragm

This finding is common when the diaphragm is low (e.g., in COPD). The liver edge may be readily palpable well below the costal margin. Percussion, however, reveals a low upper edge also, and the vertical span of the liver is normal.



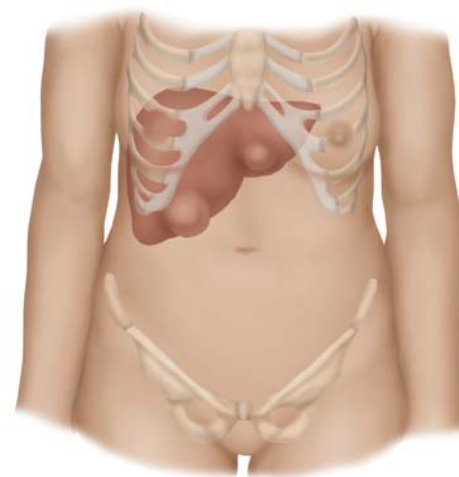
Normal Variations in Liver Shape

In some people, especially those with a lanky build, the liver tends to be elongated so that its right lobe is easily palpable as it projects downward toward the iliac crest. Such an elongation, sometimes called *Riedel's lobe*, represents a variation in shape, not an increase in liver volume or size. Examiners can only estimate the upper and lower borders of an organ with three dimensions and differing shapes. Some error is unavoidable.



Smooth Large Liver

Cirrhosis may produce an enlarged liver with a firm, *nontender* edge. The liver is not always enlarged in this condition, however, and many other diseases may produce similar findings. An enlarged liver with a smooth, *tender* edge suggests inflammation, as in hepatitis, or venous congestion, as in right-sided heart failure.



Irregular Large Liver

An enlarged liver that is firm or hard and has an irregular edge or surface suggests malignancy. There may be one or more nodules. The liver may or may not be tender.

