ANATOMY AND PHYSIOLOGY

Inspect the abdominal wall and pelvis, and visualize or palpate the landmarks 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, you may be able to feel several normal structures. The sigmoid colon is frequently palpable as a firm, narrow tube in the left lower quadrant, while the cecum and part of the ascending colon form a softer, wider tube in the right lower quadrant. Portions of the transverse and descending colon may also be palpable. None of these structures should be mistaken for a tumor. Although the normal liver often extends down just below the right costal margin, its soft consistency makes it difficult to feel through the abdominal wall. The lower margin of the liver, the liver edge, is often palpable. Also in the right upper quadrant, but usually at a deeper level, lies the lower pole of the right kidney. It is occasionally palpable, especially in thin individuals with relaxed abdominal muscles. Pulsations of the abdominal aorta are frequently visible and usually palpable in the upper abdomen, while the pulsations of the iliac arteries may sometimes be felt in the lower quadrants.

The abdominal cavity extends up under the rib cage to the dome of the diaphragm. In this protected location, beyond the reach of the palpat ing hand, are much of the liver and stomach and all of the usual normal spleen. The spleen lies against the diaphragm at the level of the 9th, 10th, and 11th ribs, mostly posterior to the left midaxillary line. It is lateral to and behind the stomach, and just above the left kidney. The tip of a normal spleen is palpable below the left costal margin in a small percentage of adults.

Most of the normal gallbladder lies deep to the liver and cannot be distinguished from it clinically. The duodenum and pancreas lie deep in the upper abdomen, where they are not normally palpable.
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 such factors 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 anatomic 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, about 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. 546).

Other structures sometimes palpable in the lower abdomen include the *uterus* enlarged by pregnancy or fibroids, which may also rise above the symphysis pubis, and the *sacral promontory*, the anterior edge of the first sacral vertebra. Until you are familiar with this normal structure, you may mistake its stony hard outlines for a tumor. Another stony hard lump that can sometimes mislead you, and may occasionally alarm a patient, is a normal *xiphoid process*.

The kidneys are posterior organs. Their upper portions are protected by the ribs. 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.

### Changes With Aging

During the middle and later years, fat tends to accumulate in the lower abdomen and near the hips, even when total body weight is stable. This accumulation, together with weakening of the abdominal muscles, often produces a potbelly. Occasionally a person notes this change with alarm and interprets it as fluid or evidence of disease.

Old age may blunt the manifestations of acute abdominal disease. Pain may be less severe, fever is often less pronounced, and signs of peritoneal inflammation, such as muscular guarding and rebound tenderness (p. 335), may be diminished or even absent.

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**THE HEALTH HISTORY**

<table>
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<tr>
<th>Common or Concerning Symptoms</th>
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**Gastrointestinal Disorders**
- Indigestion or anorexia
- Nausea, vomiting, or hematemesis
- Abdominal pain
- Dysphagia and/or odynophagia
- Change in bowel function
- Constipation or diarrhea
- Jaundice

**Urinary and Renal Disorders**
- Suprapubic pain
- Dysuria, urgency, or frequency
- Hesitancy, decreased stream in males
- Polyuria or nocturia
- Urinary incontinence
- Hematuria
- Kidney or flank pain
- Ureteral colic
EXAMPLES OF ABNORMALITIES

You will encounter a wide variety of gastrointestinal and urinary complaints in clinical practice. Careful interviewing will often lead you to the underlying disorder. This section addresses such gastrointestinal concerns as indigestion, anorexia, nausea or vomiting, hematemesis, abdominal pain, dysphagia or odynophagia, change in bowel function, constipation and diarrhea, and jaundice. There is also health history information on disorders of the urinary tract, including complaints of suprapubic pain, dysuria, urgency, frequency, hesitancy or decreased stream in males, polyuria, nocturia, incontinence, hematuria, kidney pain, and ureteral colic.

The Gastrointestinal Tract

“How is your appetite?” is a good starting question and may lead into other important areas such as indigestion, nausea, vomiting, and anorexia. Patients often complain of indigestion, a common complaint that refers to distress associated with eating, but patients use the term for many different symptoms. Find out just what your patient means. Possibilities include:

Heartburn, or a sense of burning or warmth that is retrosternal and may radiate from the epigastrium to the neck. It usually originates in the esophagus. If persistent, especially in the epigastric area, it may raise the question of heart disease. Some patients with coronary artery disease describe their pain as burning, “like indigestion.” Pay special attention to what brings on the discomfort and what relieves it. Is it precipitated by exertion and relieved by rest, suggesting angina, or is it related to meals and made worse during or after eating, suggesting gastroesophageal reflux?

Excessive gas, especially with frequent belching, abdominal bloating or distention, or flatus, the passage of gas by rectum, normally about 600 ml per day. Find out if these symptoms are associated with eating specific foods. Ask if symptoms are related to ingestion of milk or milk products.

Unpleasant abdominal fullness after meals of normal size, or early satiety, the inability to eat a full meal.

Nausea and vomiting

Abdominal pain

Anorexia, nausea, vomiting in many gastrointestinal disorders; also in pregnancy, diabetic ketoacidosis, adrenal insufficiency, hypercalcemia, uremia, liver disease, emotional states, adverse drug reactions, and other conditions. Induced but without nausea in anorexia/bulimia.

Heartburn suggests gastric acid reflux into the esophagus; often precipitated by a heavy meal, lying down, or bending forward, also by ingested alcohol, citrus juices, or aspirin. If chronic, consider reflux esophagitis. See Table 6-1, Chest Pain, pp. 234–235.

Belching, but not bloating or excess flatus, normally seen in aerophagia, or swallowing air. Also consider legumes and other gas-producing foods, intestinal lactase deficiency, irritable bowel syndrome.

Consider diabetic gastroparesis, anticholinergic drugs, gastric outlet obstruction, gastric cancer; early satiety in hepatitis.
Anorexia is a loss or lack of appetite. Find out if it arises from intolerance to certain foods or reluctance to eat due to anticipated discomfort. Nausea, often described as “feeling sick to my stomach,” may progress to retching or vomiting. *Retching* describes the spasmodic movements of the chest and diaphragm that precede and culminate in *vomiting*, the forceful expulsion of gastric contents out through the mouth.

Some patients may not actually vomit but raise esophageal or gastric contents in the absence of nausea or retching, called *regurgitation*.

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

Gastric juice is clear or 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 are termed *hematemesis*.

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

Abdominal pain has several possible mechanisms and clinical patterns and warrants careful clinical assessment. 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 when they 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, though not necessarily, palpable near the midline, at levels that vary according to the structure involved, as illustrated on the next page.

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.

- **Parietal pain** originates in the parietal peritoneum and is caused by inflammation. 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.

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**THE HEALTH HISTORY**

**EXAMPLES OF ABNORMALITIES**

- Anorexia, nausea, vomiting in many gastrointestinal disorders; also in pregnancy, diabetic ketoacidosis, adrenal insufficiency, hypercalcemia, uremia, liver disease, emotional states, adverse drug reactions. Induced but without nausea in anorexia/bulimia nervosa.

- Regurgitation in esophageal narrowing from stricture or cancer; also with incompetent gastroesophageal sphincter

- Fecal odor in small bowel obstruction or gastrocolic fistula

- Hematemesis in duodenal or peptic ulcer, esophageal or gastric varices, gastritis

- Symptoms of blood loss such as light-headedness or syncope depend on the rate and volume of bleeding, and rarely appear until blood loss \( \geq 500 \) ml.

- See Table 9-1, Abdominal Pain (pp. 350–351).

- Visceral pain in the right upper quadrant from liver distention against its capsule in alcoholic hepatitis

- Visceral periumbilical pain in early acute appendicitis from distention of inflamed appendix, gradually changing to parietal pain in the right lower quadrant from inflammation of the adjacent parietal peritoneum
referral pain is felt in more distant sites, which are innervated at approximately the same spinal levels as the disordered structure. 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.

Ask patients to describe the abdominal pain in their own words, then ask them to point to the pain. If clothes interfere, repeat the question during the physical examination. You may need to 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 a multiple-choice question such as “Is it aching, burning, gnawing, or what?”

You need to ask “How severe is the pain?” “How about on a scale of 1 to 10?” Find out if it is bearable and if it interferes with the patient’s usual activities. Does it make the patient lie down?

The description of the severity of the pain may tell you something about the patient’s responses to pain and its impact on the patient’s life, but it is not consistently helpful in assessing the pain’s cause. Sensitivity to abdominal pain varies widely and tends to diminish over the later years, masking acute abdominal problems in older people, especially those in or beyond their 70s.
Careful timing of the pain, on the other hand, is particularly helpful. Did it start suddenly or gradually? When did the pain begin? How long does it last? What is its pattern over a 24-hour period? Over weeks and months? Are you dealing with an acute illness or a chronic or recurring one?

Determine what factors aggravate or relieve the pain, with special reference to meals, antacids, alcohol, medications (including aspirin and aspirin-like drugs and any over-the-counter drugs), emotional factors, and body position. Also, is the pain related to defecation, urination, or menstruation? You also need to elicit any symptoms that are associated with the pain, such as fever or chills, and ask in what sequence they occur.

Less commonly, patients may report difficulty swallowing, or dysphagia, the sense that food or liquid is sticking, hesitating, or “wont go down right.” Dysphagia may result from esophageal disorders or from difficulty transferring food from the mouth to the esophagus. The sensation of a lump in the throat or in the retrosternal area, unassociated with swallowing, is not true dysphagia.

Ask the patient to point to where the dysphagia occurs and describe with what types of food. Does it occur with relatively solid foods such as meat, with softer foods such as ground meat and mashed potatoes, or with hot or cold liquids? Has the pattern changed?

Establish the timing. When did it start? Is it intermittent or persistent? Is it progressing? If so, over what period of time? What are the associated symptoms and medical conditions?

Odynophagia, or pain on swallowing, may occur in two forms. A sharp, burning pain suggests mucosal inflammation, while a squeezing, cramping pain suggests a muscular cause. Odynophagia may accompany dysphagia, but either symptom may occur independently.

With respect to the lower gastrointestinal tract, 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 in your bowel habits?” Frequency of bowel movements normally ranges from about three times a day to twice a week. A change in pattern within these limits, however, may be significant for an individual patient.

Patients vary widely in their views of constipation and diarrhea. Be sure to clarify what the patient means by these terms. For example, is constipation . . . a decrease in frequency of bowel movements? . . . The passage of hard and perhaps painful stools? . . . The need to strain unusually hard? . . . A sense of incomplete defecation or pressure in the rectum? Ask if the patient actually looks at the stool. If yes, what does the stool look like in terms of color and bulk? What remedies has the patient tried? Do medications, stress, unrealistic ideas

EXAMPLES OF ABNORMALITIES

Citrus fruits may aggravate the pain of reflux esophagitis; possible lactase deficiency if abdominal discomfort from milk ingestion

For types of dysphagia, see Table 9-2, Dysphagia, p. 352.

Pointing to the throat suggests a transfer or esophageal disorder; pointing to the chest suggests an esophageal disorder.

Dysphagia with solid food in mechanical narrowing of the esophagus; dysphagia related to both solids and liquids suggests a disorder of esophageal motility.

Mucosal inflammation in reflux esophagitis or infection from Candida, herpesvirus, or cytomegalovirus.

See Table 9-3, Constipation (p. 353).

Thin pencil-like stool in an obstructing “apple-core” lesion of the sigmoid colon
about normal bowel habits, or time and setting allotted for defecation play a role? Occasionally there is complete constipation with no passage of either feces or gas, or \textit{obstipation}.

Inquire about the color of the stools and ask about any \textit{black tarry stools}, suggesting \textit{melena}, or \textit{red blood in the stools}, known as \textit{hematochezia}. If either condition is present, find out how long and how often. If the blood is red, how much is there? Is it pure blood mixed in with stool or on the surface of the stool? Is there blood on the toilet paper?

\textit{Diarrhea} is an excessive frequency in the passage of stools that are usually unformed or watery. Ask about size, frequency, and volume. Are the stools bulky or small? How many episodes of diarrhea occur each day?

Ask for descriptive terms. Are the stools greasy or oily? Frothy? Foul smelling? Floating on the surface because of excessive gas, making them difficult to flush? Accompanied by mucus, pus, or blood?

Assess the course of diarrhea over time. Is it acute, chronic, or recurrent? Or is your patient experiencing the first acute episode of a chronic or recurrent illness?

Look into other factors as well. Does the diarrhea awaken the patient at night? What seem to be the aggravating or relieving factors? Does the patient get relief from a bowel movement, or is there an intense urge with straining but little or no result, known as \textit{tenesmus}. What is the setting? Does it entail travel, stress, or a new medication? Do family members or companions have similar symptoms? Are there associated symptoms?

In some patients, you will be struck by \textit{jaundice} or \textit{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:

- Increased production of bilirubin
- Decreased uptake of bilirubin by the hepatocytes
- Decreased ability of the liver to conjugate bilirubin

\textbf{EXAMPLES OF ABNORMALITIES}

- Obstipation in intestinal obstruction
  
  See Table 9-5, Black and Bloody Stools, p. 356.

- Blood on the stool surface and on toilet paper in\textit{hemorrhoids}
  
  Consistently large diarrheal stools often in small bowel or proximal colon disorders; small frequent stools with urgency of defecation in left colon or rectal disorders

  Large yellowish or gray greasy foul smelling, sometimes frothy or floating stools in \textit{steatorrhea}, or fatty stools—seen in malabsorption

  See Table 9-4, Diarrhea (pp. 354–355).

- Nocturnal diarrhea suggests a pathophysiologic cause.
  
  Relief after passing feces or gas suggests left colon or rectal disorders; tenesmus in rectal conditions near the anal sphincter

- Predominantly unconjugated bilirubin from the first three mechanisms, as in hemolytic anemia (increased production) and Gilbert’s syndrome
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 due to 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 jaundiced patient, 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 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?

Are there 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

- **Gallbladder disease** or **surgery** that may result in extrahepatic biliary obstruction

- **Hereditary disorders** in the Family History

**Examples of Abnormalities**

- Impaired excretion of conjugated bilirubin in viral hepatitis, cirrhosis, primary biliary cirrhosis, drug-induced cholestasis, as with oral contraceptives, methyl testosterone, chlorpromazine

- Obstruction of the common bile duct by gallstones or pancreatic carcinoma

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

- Acholic stools briefly in viral hepatitis, common in obstructive jaundice

- Itching in cholestatic or obstructive jaundice; pain from a distended liver capsule, biliary cholic, pancreatic cancer
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?”

What color is the urine? Has it ever been reddish or brown?

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 pressurelike. In sudden overdistention of the bladder, pain is often agonizing; in contrast, chronic bladder distention is usually painless.

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, while 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.

Commonly, there are other associated symptoms. 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 the 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.

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. \textit{Nocturia} refers to urinary frequency at night, sometimes defined as awakening the patient more than once; urine volumes may be large or small. Clarify any change in nocturnal voiding patterns and the number of trips to the bathroom.

Up to 30\% of older patients are concerned about \textit{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 has leaking of 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. 319). A number of 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 have a significant impact on 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?

Blood is the urine, or \textit{hematuria}, is an important cause for concern. When visible to the naked eye, it is called \textit{gross hematuria}. The urine may appear without polyuria during the day or night in bladder disorder or impairment to flow at or below the bladder neck.
frankly bloody. Blood may be detected only during microscopic urinalysis, known as \textit{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.

Disorders of the urinary tract may also cause \textit{kidney pain}, often reported as \textit{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. \textit{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 or chills, or hematuria.

Important Topics for Health Promotion and Counseling

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

Health promotion and counseling relevant to the abdomen include screening for alcoholism, risk of infectious hepatitis, and risk of colon cancer. Clues from social patterns and behavioral problems in the history and findings of liver enlargement or tenderness on physical examination often alert the clinician to possible alcoholism or risk of infectious hepatitis. Past medical history and family history are important when assessing risk of colon cancer.

The impact of alcohol and substance abuse on public health may be even greater than that of illicit drugs. Assessing patients for use of alcohol and other substances is a primary responsibility of all clinicians. The clinician should focus on detection, counseling, and, for significant impairment, specific recommendations for treatment. These interventions need not be time-consuming. Use the four CAGE questions, validated across many studies, to screen for alcohol dependence or abuse in all adolescents and adults, including pregnant women (see p. 413). Brief counseling interventions have been shown to reduce alcohol consumption by up to 25%.*

Focus on (1) sharing concern about the adverse effects of alcohol and education about harmful consequences, and (2) setting goals for behavioral change and follow-up. Tailor recommendations for treatment to the severity of the problem, ranging from support groups to inpatient detoxification to more extended rehabilitation.

Protective measures against infectious hepatitis include counseling about how the viruses are spread and the need for immunization. Transmission of hepatitis A is fecal–oral: fecal shedding in food handlers leads to contamination of water and foods. Illness occurs approximately 30 days after exposure. Hepatitis A vaccine is recommended for travelers to endemic areas, food handlers, military personnel, caretakers of children, Native Americans and Alaskan natives, and selected health care, sanitation, and laboratory workers. Vaccination is also recommended for homosexual contacts and injection drug users. For immediate protection and prophylaxis for household contacts and travelers, consider administering immune serum globulin.

Hepatitis B poses more serious threats to patients’ health, including risk of fulminant hepatitis as well as chronic infection and subsequent cirrhosis and hepatocellular carcinoma. Transmission occurs during contact with infected body fluids, such as blood, semen, saliva, and vaginal secretions. Adults between the ages of 20 and 39 are most affected, especially injection drug users and sex workers. Up to a tenth of infected adults become chronically infected asymptomatic carriers. Behavioral counseling and serologic screening are advised for patients at risk. Because up to 30% of patients have no identifiable risk factors, hepatitis B vaccine is recommended for all young adults not previously immunized, injection drug users and their sexual partners, persons at risk for sexually transmitted disease, travelers to endemic areas, recipients of blood products as in hemodialysis, and health care workers with frequent exposure to blood products. Many of these groups should also be screened for HIV infection.

It is also important to screen patients for colorectal cancer, second highest of the malignancies in both prevalence and mortality. Risk factors include family history of colonic polyps, history of colorectal cancer or adenoma in a first-degree relative, and a personal history of ulcerative colitis, adenomatous polyps, or prior diagnosis of endometrial, ovarian, or breast cancer. The U.S. Preventive Services Task Force recommends annual testing of all persons over age 50 with the fecal occult blood test (FOBT), sigmoidoscopy, or both, but details several caveats.** The FOBT has a highly variable sensitivity (26%–92%), but good specificity (90%–99%). It produces many false positives related to diet, selected medications, and gastrointestinal conditions such as ulcer disease, diverticulosis, and hemorrhoids. The benefits of sigmoidoscopy are linked to the length of the sigmoidoscope and its depth of insertion. Detection rates for colorectal cancer and insertion depths are roughly as follows: 25%–30% at 20 cm; 50%–55% at 35 cm; 40%–65% at

40–50 cm. Full colonoscopy or air contrast barium enema detects 80%–95% of colorectal cancers, but these procedures are more uncomfortable and colonoscopy is more expensive. When counseling patients about prevention, there is preliminary but inconsistent evidence that diets high in fiber may reduce risk of colorectal malignancy.

**EXAMPLES OF ABNORMALITIES**

Suggests peritonitis from possible appendicitis (see pp. 347–348 and pp. 363–364)
For a good abdominal examination you need (1) good light, (2) a relaxed patient, and (3) full exposure of the abdomen from 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.

**Steps for Enhancing Examination of the Abdomen**

- The patient should have an empty bladder.
- Make the patient comfortable in a supine position, with a pillow for the head and perhaps another under the knees. Slide your hand under the low back to see if the patient is relaxed and flat on the table.
- Have the patient keep arms at the sides or folded across the chest. Often patients raise their arms over their heads, but this stretches and tightens the abdominal wall, making palpation difficult.
- Before you begin palpation, ask the patient to point to any areas of pain and examine these areas last.
- Warm your hands and stethoscope, and avoid long fingernails. You may need to rub your hands together or warm them up with hot water; you can also begin palpation through the patient’s gown to absorb warmth from the patient’s body before exposing the abdomen properly. Anxiety may make the hands cool, a problem that decreases over time.
- Approach slowly and avoid quick unexpected movements. Watch the patient’s face closely for any signs of pain or discomfort.
- 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.

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 and watch for peristalsis, it is helpful to sit or bend down so that you can view the abdomen tangentially.

An arched back thrusts the abdomen forward, thus tightening the abdominal muscles.
EXAMPLES OF ABNORMALITIES

Note:

- The skin, including:
  - Scars. Describe or diagram their location.
  - Striae. Old silver striae or stretch marks, as illustrated above, are normal.
  - Dilated veins. A few small veins may be visible normally.
  - Rashes and lesions

- The umbilicus. Observe its contour and location, and any signs of inflammation or 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? Include in this 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.

TECHNIQUES OF EXAMINATION

CHAPTER 9 ■ THE ABDOMEN

Pink-purple striae of Cushing’s syndrome
Dilated veins of hepatic cirrhosis or of inferior vena cava obstruction
See Table 9-8, Localized Bulges in the Abdominal Wall (p. 360).

See Table 9-9, Protuberant Abdomens (p. 361).

Bulging flanks of ascites; suprapubic bulge of a distended bladder or pregnant uterus; hernias
Asymmetry due to an enlarged organ or mass
Lower abdominal mass of an ovarian or a uterine tumor
**AUSCULTATION**

Auscultation provides important information about bowel motility. *Listen to the abdomen before performing percussion or palpation, since these maneuvers may alter the frequency of bowel sounds.* You should 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,* vascular sounds resembling heart murmurs, over the aorta or other arteries in the abdomen, which 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*—long 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.

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 in normal persons.
TECHNIQUES OF EXAMINATION

If you suspect arterial insufficiency in the legs, 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.

Listening points for bruits in these vessels are illustrated on p. 334.

If you suspect a liver tumor, gonococcal infection around the liver, or splenic infarction, listen over the liver and spleen for friction rubs.

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 due to fluid and feces there are also typical.

- 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.

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

PALPATION

Light Palpation. Feeling the abdomen gently is especially helpful in 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. 332).

EXAMPLES OF ABNORMALITIES

Bruit with both systolic and diastolic components suggest the turbulent blood flow of partial arterial occlusion. See Table 9-10, Sounds in the Abdomen (p. 362).

See Table 9-10, Sounds in the Abdomen (p. 362).

A protuberant abdomen that is tympanitic throughout suggests intestinal obstruction. See Table 9-9, Protuberant Abdomens (p. 361).

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

Dullness in both flanks indicates further assessment for ascites (see pp. 345–347).

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

Involuntary rigidity (muscular spasm) typically persists despite these maneuvers. It indicates peritoneal inflammation.
Abdominal masses may be categorized in several ways: physiologic (pregnant uterus), inflammatory (diverticulitis of the colon), vascular (an aneurysm of the abdominal aorta), neoplastic (carcinoma of the colon), or obstructive (a distended bladder or dilated loop of bowel).

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 pain on coughing or with light percussion suggests peritoneal inflammation. See Table 9-11, Tender Abdomens (pp. 363–364).

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 most of the liver is sheltered by the rib cage, assessing it is difficult. Its size and shape can be estimated by percussion and perhaps palpation, however, and the palpating hand may enable you to evaluate its surface, consistency, and tenderness.

PERCUSSION

Measure the vertical span of liver dullness in the right midclavicular line. Starting at a level below the umbilicus (in an area of tympany, not dullness), lightly percuss upward toward the liver. Ascertain the lower border of liver dullness in the midclavicular line.

Next, identify the upper border of liver dullness in the midclavicular 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 below.

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

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 lung disease. Span, however, remains normal.
TECHNIQUES OF EXAMINATION

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, in tall people than in short. If the liver seems to be enlarged, outline the lower edge by percussing in other areas.

Although percussion is probably the most accurate clinical method for estimating the vertical size of the liver, it typically leads to underestimation.

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, while 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 edge of a normal liver is soft, sharp, and regular, its surface smooth. The normal liver may be slightly tender.

On inspiration, the liver (on the following page) is palpable about 3 cm below the right costal margin in the midclavicular line.

NORMAL LIVER SPANS

4 – 8 cm in midsternal line

6 – 12 cm in right midclavicular line

EXAMPLES OF ABNORMALITIES

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.

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 merging with it. It is dull to percussion.

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.

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 merging with it. It is dull to percussion.
Some people breathe more with their chests than with their diaphragms. 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.

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.

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.

See Table 9-12, Liver Enlargement: Apparent and Real (pp. 365–366).

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

Assessing 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.

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 cannot confirm splenic enlargement but can raise your suspicions of it. 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.

Dullness, as shown on the following page, raises the question of splenomegaly.
This is variable, but 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.

- **Check for a splenic percussion sign.** Percuss the lowest interspace in the left anterior axillary line, as shown below. 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.

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

**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...
TECHNIQUES OF EXAMINATION

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 a small percentage 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.

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.

EXAMPLES OF ABNORMALITIES

A palpable spleen tip, though not necessarily abnormal, may indicate splenic enlargement. The spleen tip below is just palpable deep to the left costal margin.

The enlarged spleen shown below 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. 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.

**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 left flank mass (see the solid line on photo on previous page) may represent marked splenomegaly or an enlarged left kidney. Suspect splenomegaly if notch palpated on medial border, 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.
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.

**Assessing Kidney Tenderness.** 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. 10).

**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.

**The Aorta**

Press firmly deep in the upper abdomen, slightly to the left of the midline, and identify the aortic pulsations. In persons over age 50, try to 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

**Examples of Abnormalities**

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

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

- 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

- In an older person, a periumbilical or upper abdominal mass with expansile pulsations suggests an aortic aneurysm.
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.

An aortic aneurysm is a pathologic dilatation of the aorta, usually due to arteriosclerosis. A merely tortuous abdominal aorta, however, may be difficult to distinguish from an aneurysm on clinical grounds.

Although an aneurysm is usually painless, pain may herald its most dreaded and frequent complication—rupture of the aorta.

Apparent enlargement of the aorta indicates assessment by ultrasound.

Special Techniques

Assessment Techniques for:
- Ascites
- Appendicitis
- Acute cholecystitis
- Ventril 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, while 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.
Two further techniques help to confirm the presence of 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.

- **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.

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

An easily palpable impulse suggests ascites.
Identifying an Organ or a Mass in an Ascitic Abdomen. Try to ballotte 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 well 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.

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

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 be caused by, for example, inflamed adnexa or an inflamed seminal vesicle, as well as by an inflamed appendix.
TECHNIQUES OF EXAMINATION

Some 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. 510.)

- 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.

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.
TECHNIQUES OF EXAMINATION

Inguinal and femoral hernias are discussed in the next chapter. They can give rise to important abdominal problems and must not be overlooked.

MASS IN THE ABDOMINAL WALL

To Distinguish 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.

EXAMPLES OF ABNORMALITIES

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.
<table>
<thead>
<tr>
<th>Problem</th>
<th>Process</th>
<th>Location</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peptic Ulcer and Dyspepsia (These disorders cannot be reliably differentiated by symptoms and signs.)</td>
<td>Peptic ulcer refers to a demonstrable ulcer, usually in the duodenum or stomach. Dyspepsia causes similar symptoms but no ulceration. Infection by <em>Helicobacter pylori</em> is often present.</td>
<td>Epigastric, may radiate to the back</td>
<td>Variable: gnawing burning, boring, aching, pressing, or hungerlike</td>
</tr>
<tr>
<td>Cancer of the Stomach</td>
<td>A malignant neoplasm</td>
<td>Epigastric</td>
<td>Variable</td>
</tr>
<tr>
<td>Acute Pancreatitis</td>
<td>An acute inflammation of the pancreas</td>
<td>Epigastric, may radiate to the back or other parts of the abdomen; may be poorly localized</td>
<td>Usually steady</td>
</tr>
<tr>
<td>Chronic Pancreatitis</td>
<td>Fibrosis of the pancreas secondary to recurrent inflammation</td>
<td>Epigastric, radiating through to the back</td>
<td>Steady, deep</td>
</tr>
<tr>
<td>Cancer of the Pancreas</td>
<td>A malignant neoplasm</td>
<td>Epigastric and in either upper quadrant; often radiates to the back</td>
<td>Steady, deep</td>
</tr>
<tr>
<td>Biliary Colic</td>
<td>Sudden obstruction of the cystic duct or common bile duct by a gallstone</td>
<td>Epigastric or right upper quadrant; may radiate to the right scapula and shoulder</td>
<td>Steady, aching; not colicky</td>
</tr>
<tr>
<td>Acute Cholecystitis</td>
<td>Inflammation of the gallbladder, usually from obstruction of the cystic duct by a gallstone</td>
<td>Right upper quadrant or upper abdominal; may radiate to the right scapular area</td>
<td>Steady, aching</td>
</tr>
<tr>
<td>Acute Diverticulitis</td>
<td>Acute inflammation of a colonic diverticulum, a saclike mucosal outpouching through the colonic muscle</td>
<td>Left lower quadrant</td>
<td>May be cramping at first, but becomes steady</td>
</tr>
<tr>
<td>Acute Appendicitis</td>
<td>Acute inflammation of the appendix with distention or obstruction</td>
<td>Poorly localized periumbilical pain, followed usually by Right lower quadrant pain</td>
<td>Mild but increasing, possibly cramping</td>
</tr>
<tr>
<td>Acute Mechanical Intestinal Obstruction</td>
<td>Obstruction of the bowel lumen, most commonly caused by (1) adhesions or hernias (small bowel), or (2) cancer or diverticulitis (colon)</td>
<td>Small bowel: periumbilical or upper abdominal Colon: lower abdominal or generalized</td>
<td>Steady and more severe Cramping</td>
</tr>
<tr>
<td>Mesenteric Ischemia</td>
<td>Blood supply to the bowel and mesentery blocked from thrombosis or embolus (acute arterial occlusion), or reduced from hypoperfusion</td>
<td>May be periumbilical at first, then diffuse</td>
<td>Cramping at first, then steady</td>
</tr>
</tbody>
</table>
## TABLE 9-1 Abdominal Pain

<table>
<thead>
<tr>
<th>Timing</th>
<th>Factors That May Aggravate</th>
<th>Factors That May Relieve</th>
<th>Associated Symptoms and Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td>Variable</td>
<td>Food and antacids may bring relief, but not necessarily in any of these disorders and least commonly in gastric ulcer.</td>
<td>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 yr), gastric ulcer in those over 50 yr, and duodenal ulcer in those from 30–60 yr.</td>
</tr>
<tr>
<td>The history of pain is typically shorter than in peptic ulcer. The pain is persistent and slowly progressive.</td>
<td>Often food</td>
<td>Not relieved by food or antacids</td>
<td>Anorexia, nausea, early satiety, weight loss, and sometimes bleeding. Most common in ages 50–70</td>
</tr>
<tr>
<td>Acute onset, persistent pain</td>
<td>Lying supine</td>
<td>Leaning forward with trunk flexed</td>
<td>Nausea, vomiting, abdominal distention, fever. Often a history of previous attacks and alcohol abuse or gallstones</td>
</tr>
<tr>
<td>Chronic or recurrent course</td>
<td>Alcohol, heavy or fatty meals</td>
<td>Possibly leaning forward with trunk flexed; often intractable</td>
<td>Symptoms of decreased pancreatic function may appear: diarrhea with fatty stools (steatorrhea) and diabetes mellitus.</td>
</tr>
<tr>
<td>Persistent pain; relentlessly progressive illness</td>
<td></td>
<td>Possibly leaning forward with trunk flexed; often intractable</td>
<td>Anorexia, nausea, vomiting, weight loss, and jaundice. Emotional symptoms, including depression</td>
</tr>
<tr>
<td>Rapid onset over a few minutes, lasts one to several hours and subsides gradually. Often recurrent</td>
<td></td>
<td></td>
<td>Anorexia, nausea, vomiting, restlessness</td>
</tr>
<tr>
<td>Gradual onset; course longer than in biliary colic</td>
<td>Jarring, deep breathing</td>
<td></td>
<td>Anorexia, nausea, vomiting, and fever</td>
</tr>
<tr>
<td>Often a gradual onset</td>
<td></td>
<td></td>
<td>Fever, constipation. There may be initial brief diarrhea.</td>
</tr>
</tbody>
</table>

- Lasts roughly 4–6 hr
- Depends on intervention
- Paroxysmal; may decrease as bowel mobility is impaired
- Paroxysmal, though typically milder
- Usually abrupt in onset, then persistent

Movements or coughs, if it subsides temporarily, suspect perforation of the appendix. 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). Obstruction develops.
- Obstipation early. Vomiting late if at all. Prior symptoms of underlying cause.
- Vomiting, diarrhea (sometimes bloody), constipation, shock
# TABLE 9-2  ■ Dysphagia

<table>
<thead>
<tr>
<th>Process and Problem</th>
<th>Timing</th>
<th>Factors That Aggravate</th>
<th>Factors That Relieve</th>
<th>Associated Symptoms and Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transfer Dysphagia, due to motor disorders affecting the pharyngeal muscles</strong></td>
<td>Acute or gradual onset and a variable course, depending on the underlying disorder</td>
<td>Attempts to start the swallowing process</td>
<td>Aspiration into the lungs or regurgitation into the nose with attempts to swallow. Neurologic evidence of stroke, bulbar palsy, or other neuro-muscular conditions</td>
<td></td>
</tr>
<tr>
<td><strong>Esophageal Dysphagia</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mechanical Narrowing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>■ Mucosal rings and webs</td>
<td>Intermittent</td>
<td>Solid foods</td>
<td>Regurgitation of the bolus of food</td>
<td>Usually none</td>
</tr>
<tr>
<td>■ Esophageal stricture</td>
<td>Intermittent, may become slowly progressive</td>
<td>Solid foods</td>
<td>Regurgitation of the bolus of food</td>
<td>A long history of heartburn and regurgitation</td>
</tr>
<tr>
<td>■ Esophageal cancer</td>
<td>May be intermittent at first; progressive over months</td>
<td>Solid foods, with progression to liquids</td>
<td>Regurgitation of the bolus of food</td>
<td>Pain in the chest and back and weight loss, especially late in the course of illness</td>
</tr>
<tr>
<td><strong>Motor Disorders</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>■ Diffuse esophageal spasm</td>
<td>Intermittent</td>
<td>Solids or liquids</td>
<td>Maneuvers described below; sometimes nitroglycerin</td>
<td>Chest pain that mimics angina pectoris or myocardial infarction and lasts minutes to hours; possibly heartburn</td>
</tr>
<tr>
<td>■ Scleroderma</td>
<td>Intermittent, may progress slowly</td>
<td>Solids or liquids</td>
<td>Repeated swallowing, movements such as straightening the back, raising the arms, or a Valsalva maneuver (straining down against a closed glottis)</td>
<td>Heartburn. Other manifestations of scleroderma</td>
</tr>
<tr>
<td>■ Achalasia</td>
<td>Intermittent, may progress</td>
<td>Solids or liquids</td>
<td>Regurgitation, often at night when lying down, with nocturnal cough; possibly chest pain precipitated by eating</td>
<td></td>
</tr>
</tbody>
</table>
## TABLE 9-3  ■ Constipation

<table>
<thead>
<tr>
<th>Problem</th>
<th>Process</th>
<th>Associated Symptoms and Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Activities and Habits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inadequate Time or Setting for the Defecation Reflex</td>
<td>Ignoring the sensation of a full rectum inhibits the defecation reflex.</td>
<td>Hectic schedules, unfamiliar surroundings, bed rest</td>
</tr>
<tr>
<td>False Expectations of Bowel Habits</td>
<td>Expectations of “regularity” or more frequent stools than a person’s norm</td>
<td>Beliefs, treatments, and advertisements that promote the use of laxatives</td>
</tr>
<tr>
<td>Diet Deficient in Fiber</td>
<td>Decreased fecal bulk</td>
<td>Other factors such as debilitation and constipating drugs may contribute.</td>
</tr>
<tr>
<td>Irritable Bowel Syndrome</td>
<td>A common disorder of bowel motility</td>
<td>Small, hard stools, often with mucus. Periods of diarrhea. Cramping abdominal pain. Stress may aggravate.</td>
</tr>
<tr>
<td>Mechanical Obstruction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cancer of the Rectum or Sigmoid Colon</td>
<td>Progressive narrowing of the bowel lumen</td>
<td>Change in bowel habits; often diarrhea, abdominal pain, and bleeding. In rectal cancer, tenesmus and pencil-shaped stools</td>
</tr>
<tr>
<td>Fecal Impaction</td>
<td>A large, firm, immovable fecal mass, most often in the rectum</td>
<td>Rectal fullness, abdominal pain, and diarrhea around the impaction. Common in debilitated, bedridden, and often elderly patients</td>
</tr>
<tr>
<td>Other Obstructing Lesions (such as diverticulitis, volvulus, intussusception, or hernia)</td>
<td>Narrowing or complete obstruction of the bowel</td>
<td>Colicky abdominal pain, abdominal distention, and in intussusception, often “currant jelly” stools (red blood and mucus)</td>
</tr>
<tr>
<td>Painful Anal Lesions</td>
<td>Pain may cause spasm of the external sphincter and voluntary inhibition of the defecation reflex.</td>
<td>Anal fissures, painful hemorrhoids, perirectal abscesses</td>
</tr>
<tr>
<td>Drugs</td>
<td>A variety of mechanisms</td>
<td>Opiates, anticholinergics, antacids containing calcium or aluminum, and many others</td>
</tr>
<tr>
<td>Depression</td>
<td>A disorder of mood. See Table 16-1, Disorders of Mood</td>
<td>Fatigue, feelings of depression, and other somatic symptoms</td>
</tr>
<tr>
<td>Neurologic Disorders</td>
<td>Interference with the autonomic innervation of the bowel</td>
<td>Spinal cord injuries, multiple sclerosis, Hirschsprung’s disease, and other conditions</td>
</tr>
<tr>
<td>Metabolic Conditions</td>
<td>Interference with bowel motility</td>
<td>Pregnancy, hypothyroidism, hypercalcemia</td>
</tr>
</tbody>
</table>
TABLE 9-4  Diarrhea

<table>
<thead>
<tr>
<th>Problem</th>
<th>Process</th>
<th>Characteristics of Stool</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acute Diarrhea</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Secretory Infections</strong></td>
<td>Infection by viruses, preformed bacterial toxins</td>
<td>Watery, without blood, pus, or mucus</td>
</tr>
<tr>
<td>(such as <em>Staphylococcus aureus</em>, <em>Clostridium perfringens</em>, toxigenic <em>Escherichia coli</em>, <em>Vibrio cholerae</em>), cryptosporidium, <em>Giardia lamblia</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inflammatory Infections</strong></td>
<td>Colonization or invasion of intestinal mucosa</td>
<td>Loose to watery, often with blood, pus, or mucus</td>
</tr>
<tr>
<td>(nontyphoid <em>Salmonella</em>, <em>Shigella</em>, <em>Yersinia</em>, <em>Campylobacter</em>, enteropathic <em>E. coli</em>, <em>Entamoeba histolytica</em>)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Drug-Induced Diarrhea</strong></td>
<td>Action of many drugs, such as magnesium-containing antacids, antibiotics, antineoplastic agents, and laxatives</td>
<td>Loose to watery</td>
</tr>
<tr>
<td><strong>Chronic Diarrhea</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Diarrheal Syndromes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irritable bowel syndrome</td>
<td>A disorder of bowel motility with alternating diarrhea and constipation</td>
<td>Loose; may show mucus but no blood. Small, hard stools with constipation</td>
</tr>
<tr>
<td>Cancer of the sigmoid colon</td>
<td>Partial obstruction by a malignant neoplasm</td>
<td>May be blood-streaked</td>
</tr>
<tr>
<td>Ulcerative colitis</td>
<td>Inflammation of the mucosa and submucosa of the rectum and colon with ulceration; cause unknown</td>
<td>From soft to watery, often containing blood</td>
</tr>
<tr>
<td>Crohn’s disease of the small bowel (regional enteritis) or colon (granulomatous colitis)</td>
<td>Chronic inflammation of the bowel wall, typically involving the terminal ileum and/or proximal colon</td>
<td>Small, soft to loose or watery, usually free of gross blood (enteritis) or with less bleeding than ulcerative colitis (colitis)</td>
</tr>
<tr>
<td><strong>Voluminous Diarrheas</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malabsorption syndromes</td>
<td>Defective absorption of fat, including fat-soluble vitamins, with steatorrhea (excessive excretion of fat) as in pancreatic insufficiency, bile salt deficiency, bacterial overgrowth</td>
<td>Typically bulky, soft, light yellow to gray, mushy, greasy or oily, and sometimes frothy; particularly foul-smelling; usually floats in the toilet</td>
</tr>
<tr>
<td>Osmotic diarrheas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lactose intolerance</td>
<td>Deficiency in intestinal lactase</td>
<td>Watery diarrhea of large volume</td>
</tr>
<tr>
<td>Abuse of osmotic purgatives</td>
<td>Laxative habit, often surreptitious</td>
<td>Watery diarrhea of large volume</td>
</tr>
<tr>
<td>Secretory diarrheas from bacterial infection, secreting villous adenoma, fat or bile salt malabsorption, hormone-mediated conditions (gastrin in Zollinger–Ellison syndrome, vasoactive intestinal peptide [VIP])</td>
<td>Variable</td>
<td>Watery diarrhea of large volume</td>
</tr>
<tr>
<td>Timing</td>
<td>Associated Symptoms</td>
<td>Setting, Persons at Risk</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Duration of a few days, possibly longer. Lactase deficiency may lead to a longer course.</td>
<td>Nausea, vomiting, periumbilical cramping pain. Temperature normal or slightly elevated</td>
<td>Often travel, a common food source, or an epidemic</td>
</tr>
<tr>
<td>An acute illness of varying duration</td>
<td>Lower abdominal cramping pain and often rectal urgency, tenesmus; fever</td>
<td>Travel, contaminated food or water. Men and women who have had frequent anal intercourse.</td>
</tr>
<tr>
<td>Acute, recurrent, or chronic</td>
<td>Possibly nausea; usually little if any pain</td>
<td>Prescribed or over-the-counter medications</td>
</tr>
<tr>
<td>Often worse in the morning. Diarrhea rarely wakes the patient at night.</td>
<td>Crampy lower abdominal pain, abdominal distention, flatulence, nausea, constipation</td>
<td>Young and middle-aged adults, especially women</td>
</tr>
<tr>
<td>Variable</td>
<td>Change in usual bowel habits, crampy lower abdominal pain, constipation</td>
<td>Middle-aged and older adults, especially over 55 yr</td>
</tr>
<tr>
<td>Onset ranges from insidious to acute. Typically recurrent, may be persistent. Diarrhea may wake the patient at night.</td>
<td>Crampy lower or generalized abdominal pain, anorexia, weakness, fever</td>
<td>Often young people</td>
</tr>
<tr>
<td>Insidious onset, chronic or recurrent. Diarrhea may wake the patient at night.</td>
<td>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</td>
<td>Often young people, especially in the late teens, but also in the middle years. More common in people of Jewish descent</td>
</tr>
<tr>
<td>Onset of illness typically insidious</td>
<td>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)</td>
<td>Variable, depending on cause</td>
</tr>
<tr>
<td>Follows the ingestion of milk and milk products; is relieved by fasting</td>
<td>Crampy abdominal pain, abdominal distention, flatulence</td>
<td>African Americans, Asians, Native Americans</td>
</tr>
<tr>
<td>Variable</td>
<td>Often none</td>
<td>Persons with anorexia nervosa or bulimia nervosa</td>
</tr>
<tr>
<td>Variable</td>
<td>Weight loss, dehydration, nausea, vomiting, and cramping abdominal pain</td>
<td>Variable depending on cause</td>
</tr>
</tbody>
</table>
### TABLE 9-5 Black and Bloody Stools

<table>
<thead>
<tr>
<th>Problem</th>
<th>Selected Causes</th>
<th>Associated Symptoms and Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Melena</strong></td>
<td>Peptic ulcer</td>
<td>Often, but not necessarily, a history of epigastric pain</td>
</tr>
<tr>
<td></td>
<td>Gastritis or stress ulcers</td>
<td>Recent ingestion of alcohol, aspirin, or other anti-inflammatory drugs; recent bodily trauma, severe burns, surgery, or increased intracranial pressure</td>
</tr>
<tr>
<td></td>
<td>Esophageal or gastric varices</td>
<td>Cirrhosis of the liver or other cause of portal hypertension</td>
</tr>
<tr>
<td></td>
<td>Reflux esophagitis</td>
<td>History of heartburn</td>
</tr>
<tr>
<td></td>
<td>Mallory–Weiss tear, a mucosal tear in the esophagus due to retching and vomiting</td>
<td>Retching, vomiting, often recent ingestion of alcohol</td>
</tr>
<tr>
<td><strong>Black, Nonsticky Stools</strong></td>
<td>Ingestion of iron, bismuth salts as in Pepto-Bismol, licorice, or even commercial chocolate cookies</td>
<td></td>
</tr>
<tr>
<td><strong>Red Blood in the Stools</strong></td>
<td>Cancer of the colon</td>
<td>Often a change in bowel habits</td>
</tr>
<tr>
<td></td>
<td>Benign polyps of the colon</td>
<td>Often no other symptoms</td>
</tr>
<tr>
<td></td>
<td>Diverticula of the colon</td>
<td>Often no other symptoms</td>
</tr>
</tbody>
</table>
| | Inflammatory conditions of the colon and rectum  
  - Ulcerative colitis  
  - Infectious dysenteries  
  - Proctitis (various causes) in men or women who have had frequent anal intercourse | See Table 9-5, Diarrhea. |
| | Ischemic colitis | See Table 9-5, Diarrhea. |
| | Hemorrhoids | Rectal urgency, tenesmus |
| | Anal fissure | L |
TABLE 9-6  ■  Frequency, Nocturia, and Polyuria

<table>
<thead>
<tr>
<th>Problem</th>
<th>Mechanisms</th>
<th>Selected Causes</th>
<th>Associated Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>Decreased capacity of the bladder</td>
<td>Infection, stones, tumor, or foreign body in the bladder</td>
<td>Burning on urination, urinary urgency, sometimes gross hematuria</td>
</tr>
<tr>
<td></td>
<td>Increased bladder sensitivity to stretch because of inflammation</td>
<td>Infiltration by scar tissue or tumor</td>
<td>Symptoms of associated inflammation (see above) are common.</td>
</tr>
<tr>
<td></td>
<td>Decreased elasticity of the bladder wall</td>
<td>Motor disorders of the central nervous system, such as a stroke</td>
<td>Urinary urgency; neurologic symptoms such as weakness and paralysis</td>
</tr>
<tr>
<td></td>
<td>Decreased cortical inhibition of bladder contractions</td>
<td>Most commonly, benign prostatic hyperplasia; also urethral stricture and other obstructive lesions of the bladder or prostate</td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>Impaired emptying of the bladder with residual urine in the bladder</td>
<td>Neurologic disease affecting the sacral nerves or nerve roots, e.g., diabetic neuropathy</td>
<td>Weakness or sensory defects</td>
</tr>
<tr>
<td></td>
<td>Partial mechanical obstruction of the bladder neck or proximal urethra</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loss of peripheral nerve supply to the bladder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nocturia</td>
<td>Most types of polyuria (see pp. 327–328)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With High Volumes</td>
<td>Decreased concentrating ability of the kidney with loss of the normal decrease in nocturnal urinary output</td>
<td>Chronic renal insufficiency due to a number of diseases</td>
<td>Possibly other symptoms of renal insufficiency</td>
</tr>
<tr>
<td></td>
<td>Excessive fluid intake before bedtime</td>
<td>Habit, especially involving alcohol and coffee</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fluid-retaining, edematous states. Dependent edema accumulates during the day and is excreted when the patient lies down at night</td>
<td>Congestive heart failure, nephrotic syndrome, hepatic cirrhosis with ascites, chronic venous insufficiency</td>
<td>Edema and other symptoms of the underlying disorder. Urinary output during the day may be reduced as fluid reaccumulates in the body. See Table 14-4, Some Peripheral Causes of Edema.</td>
</tr>
<tr>
<td>With Low Volumes</td>
<td>Frequency</td>
<td>Insomnia</td>
<td>Variable</td>
</tr>
<tr>
<td>Polyuria</td>
<td>Voiding while up at night without a real urge, a “pseudo-frequency”</td>
<td></td>
<td>Thirst and polydipsia, often severe and persistent; nocturia</td>
</tr>
<tr>
<td></td>
<td>Deficiency of antidiuretic hormone (diabetes insipidus)</td>
<td>A disorder of the posterior pituitary and hypothalamus</td>
<td>Thirst and polydipsia, often severe and persistent; nocturia</td>
</tr>
<tr>
<td></td>
<td>Renal unresponsiveness to antidiuretic hormone (nephrogenic diabetes insipidus)</td>
<td>A number of kidney diseases, including hypercalcemic and hypokalemic nephropathy; drug toxicity, e.g., from lithium</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Solute diuresis</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Electrolytes, such as sodium salts</td>
<td>Large saline infusions, potent diuretics, certain kidney diseases</td>
<td>Variable</td>
</tr>
<tr>
<td></td>
<td>■ Nonelectrolytes, such as glucose</td>
<td>Uncontrolled diabetes mellitus</td>
<td>Thirst, polydipsia, and nocturia</td>
</tr>
<tr>
<td></td>
<td>Excessive water intake</td>
<td>Primary polydipsia</td>
<td>Polydipsia tends to be episodic. Thirst may not be present. Nocturia is usually absent.</td>
</tr>
</tbody>
</table>
# Urinary Incontinence

<table>
<thead>
<tr>
<th>Problem</th>
<th>Mechanisms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stress Incontinence</strong></td>
<td>The urethral sphincter is weakened so that transient increases in intraabdominal pressure raise the bladder pressure to levels that exceed urethral resistance.</td>
</tr>
<tr>
<td></td>
<td>In women, most 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. Suggested 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.</td>
</tr>
<tr>
<td><strong>Urge Incontinence</strong></td>
<td>Detrusor contractions are stronger than normal and overcome the normal urethral resistance. The bladder is typically small.</td>
</tr>
<tr>
<td></td>
<td>- Decreased cortical inhibition of detrusor contractions, as by strokes, brain tumors, dementia, and lesions of the spinal cord above the sacral level</td>
</tr>
<tr>
<td></td>
<td>- Hyperexcitability of sensory pathways, caused by, for example, bladder infections, tumors, and fecal impaction</td>
</tr>
<tr>
<td></td>
<td>- Deconditioning of voiding reflexes, caused by, for example, frequent voluntary voiding at low bladder volumes</td>
</tr>
<tr>
<td><strong>Overflow Incontinence</strong></td>
<td>Detrusor contractions are insufficient to overcome urethral resistance. The bladder is typically large, even after an effort to void.</td>
</tr>
<tr>
<td></td>
<td>- Obstruction of the bladder outlet, as by benign prostatic hyperplasia or tumor</td>
</tr>
<tr>
<td></td>
<td>- Weakness of the detrusor muscle associated with peripheral nerve disease at the sacral level</td>
</tr>
<tr>
<td></td>
<td>- Impaired bladder sensation that interrupts the reflex arc, as from diabetic neuropathy</td>
</tr>
<tr>
<td><strong>Functional Incontinence</strong></td>
<td>This is a functional inability to get to the toilet in time because of impaired health or environmental conditions.</td>
</tr>
<tr>
<td><strong>Incontinence Secondary to Medications</strong></td>
<td>Drugs may contribute to any type of incontinence listed.</td>
</tr>
<tr>
<td></td>
<td>Problems in mobility resulting from weakness, arthritis, poor vision, or other conditions. Environmental factors such as an unfamiliar setting, distant bathroom facilities, bedrails, or physical restraints</td>
</tr>
<tr>
<td></td>
<td>Sedatives, tranquilizers, anticholinergics, sympathetic blockers, and potent diuretics</td>
</tr>
</tbody>
</table>

*Patients may have more than one kind of incontinence.*
<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Physical Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Momentary leakage of small amounts of urine concurrent with stresses such as coughing, laughing, and sneezing while the person is in an upright position. A desire to urinate is not associated with pure stress incontinence.</td>
<td>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.</td>
</tr>
<tr>
<td>Incontinence preceded by an urge to void. The volume tends to be moderate.</td>
<td>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.</td>
</tr>
<tr>
<td>Frequency and nocturia with small to moderate volumes</td>
<td>An enlarged bladder is often found on abdominal examination and may be tender. Other possible signs include prostatic enlargement, motor signs of peripheral nerve disease, a decrease in sensation including perineal sensation, and diminished to absent reflexes.</td>
</tr>
<tr>
<td>If acute inflammation is present, pain on urination</td>
<td>The bladder is not detectable on physical examination. Look for physical or environmental clues to the likely cause.</td>
</tr>
<tr>
<td>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</td>
<td></td>
</tr>
<tr>
<td>A continuous dripping or dribbling incontinence</td>
<td></td>
</tr>
<tr>
<td>Decreased force of the urinary stream</td>
<td></td>
</tr>
<tr>
<td>Prior symptoms of partial urinary obstruction or other symptoms of peripheral nerve disease may be present.</td>
<td></td>
</tr>
<tr>
<td>Incontinence on the way to the toilet or only in the early morning</td>
<td></td>
</tr>
<tr>
<td>Variable. A careful history and chart review are important.</td>
<td>Variable</td>
</tr>
</tbody>
</table>
TABLE 9-8 • 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.

**Umbilical Hernia**

Umbilical hernias protrude through a defective umbilical ring. They are most common in infants but also occur in adults. In infants, but not in adults, they usually close spontaneously within a year or two.

**Incisional Hernia**

An incisional hernia protrudes through an operative scar. By palpation, note 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 of complications than a large defect.

**Epigastric Hernia**

An epigastric hernia is a small midline protrusion through a defect in the linea alba, somewhere between the xiphoid process and the umbilicus. With the patient’s head and shoulders raised (or with the patient standing), look for it, and run your fingerpad down the linea alba to feel it.

**Diastasis Recti**

A rectus diastasis is a separation of the two rectus abdominis muscles, through which abdominal contents bulge to form a midline ridge when the patient raises head and shoulders. Repeated pregnancies, obesity, and chronic lung disease may predispose to it. It has no clinical consequences.

**Lipoma**

Lipomas are common, benign, fatty tumors usually located in the subcutaneous tissues almost anywhere in the body, including the abdominal wall. Small or large, they are usually soft and often lobulated. When your finger presses down on the edge of a lipoma, the tumor typically slips out from under it.
### Protuberant Abdomens

<table>
<thead>
<tr>
<th>Fat</th>
<th>Gas</th>
<th>Tumor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fat is the most common cause of a protuberant abdomen and is associated with generalized obesity. The abdominal wall is thick. Fat in the mesentery and omentum also contributes to abdominal size. The umbilicus may appear sunken. The percussion note is normal. A pannus, or apron of fatty tissue, may extend below the inguinal ligaments. Lift it to look for inflammation in the skin fold or even for a hidden hernia.</td>
<td>Gaseous distention may be localized or generalized. It causes a tympanic percussion note. Increased intestinal gas production due to 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.</td>
<td>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.</td>
</tr>
</tbody>
</table>

### Pregnancy

Pregnancy is a common cause of a pelvic “mass.” Listen for the fetal heart (see pp. 421–422).

### Ascitic Fluid

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. 345–347 for the assessment of ascites.)
<table>
<thead>
<tr>
<th>TABLE 9-10</th>
<th>Sounds in the Abdomen</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bowel Sounds</strong></td>
<td><strong>Bruits</strong></td>
</tr>
<tr>
<td>Bowel sounds may be:</td>
<td>A <em>hepatic bruit</em> suggests carcinoma of the liver or alcoholic hepatitis. <em>Arterial bruits</em> with both systolic and diastolic components suggest partial occlusion of the aorta or large arteries. Partial occlusion of a renal artery may cause and explain hypertension.</td>
</tr>
<tr>
<td>- <em>Increased</em>, as from diarrhea or early intestinal obstruction</td>
<td></td>
</tr>
<tr>
<td>- <em>Decreased</em>, then absent, as in <em>adynamic ileus</em> and <em>peritonitis</em>. Before deciding that bowel sounds are absent, sit down and listen where shown for 2 min or even longer.</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td><strong>Venous Hum</strong></td>
<td><strong>Friction Rubs</strong></td>
</tr>
<tr>
<td>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.</td>
<td>Friction rubs are rare. They are grating sounds with respiratory variation. They indicate inflammation of the peritoneal surface of an organ, as from a liver tumor, chlamydial or gonococcal perihepatitis, recent liver biopsy, or splenic infarct. When a systolic bruit accompanies a hepatic friction rub, suspect carcinoma of the liver.</td>
</tr>
</tbody>
</table>
### TABLE 9-11  ■ Tender Abdomens

#### Abdominal Wall Tenderness

- **Superficial tender area**
- **Deep tender areas**

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

#### Visceral Tenderness

- **Enlarged liver**
- **Normal aorta**
- **Normal cecum**
- **Normal or spastic sigmoid colon**

The structures shown may be tender to deep palpation. Usually the discomfort is dull and there is 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 be due to 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 next page)*
### Tender Abdomens (Continued)

#### 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. Local causes of peritoneal inflammation include:

**Acute Cholecystitis**

Signs are maximal in the right upper quadrant. Check for Murphy’s sign (see p. 348).

**Acute Pancreatitis**

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

**Acute Appendicitis**

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.
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 then they are far from perfect.

Downward Displacement of the Liver by a Low Diaphragm
This is a common finding (e.g., in emphysema) when the diaphragm is low. 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 persons, especially those with a lanky build, the liver tends to be somewhat 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. This variant illustrates the basic limitations of assessing liver size. We can only estimate the upper and lower borders of an organ that has three dimensions and differing shapes. Some error is unavoidable.

(table continues next page)
**Smooth Large Nontender 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.

**Smooth Large Tender Liver**

An enlarged liver with a smooth tender edge suggests inflammation, as in hepatitis, or venous congestion, as in right-sided heart failure.

**Large Irregular 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.