



University of Kerbala / College of Nursing
Adult Nursing Department
Health Assessment
Abdominal Assessment



ANATOMY AND PHYSIOLOGY

The abdominal cavity, the largest cavity in the human body, contains the stomach, small and large intestines, liver, gallbladder, pancreas, spleen, kidneys, ureters, bladder, adrenal glands, and major vessels (Figs. 13-1 and 13-2). In women the uterus, fallopian tubes, and ovaries are located within the abdominal cavity. Lying outside the abdominal cavity, but a vital part of the gastrointestinal (GI) system, is the esophagus.

PERITONEUM, MUSCULATURE, AND CONNECTIVE TISSUE:

The abdominal lining, called the *peritoneum*, is a serous membrane forming a protective cover. It is divided into two layers: the parietal peritoneum and the visceral peritoneum. The parietal peritoneum lines the abdominal wall, and the visceral peritoneum covers organs. The space between the parietal peritoneum and visceral peritoneum is the peritoneal cavity. It usually contains a small amount of serous fluid to reduce friction between abdominal organs and their membranes.

ALIMENTARY TRACT: From the mouth to the anus the adult alimentary tract extends 27 feet (8.2 m) and includes the esophagus, stomach, small intestine, large intestine, rectum, and anal canal (see Fig. 1). Its main functions are to ingest and digest food; absorb nutrients, electrolytes, and water; and excrete waste products. Products of digestion are moved along the digestive tract by peristalsis, under the control of the autonomic nervous system.

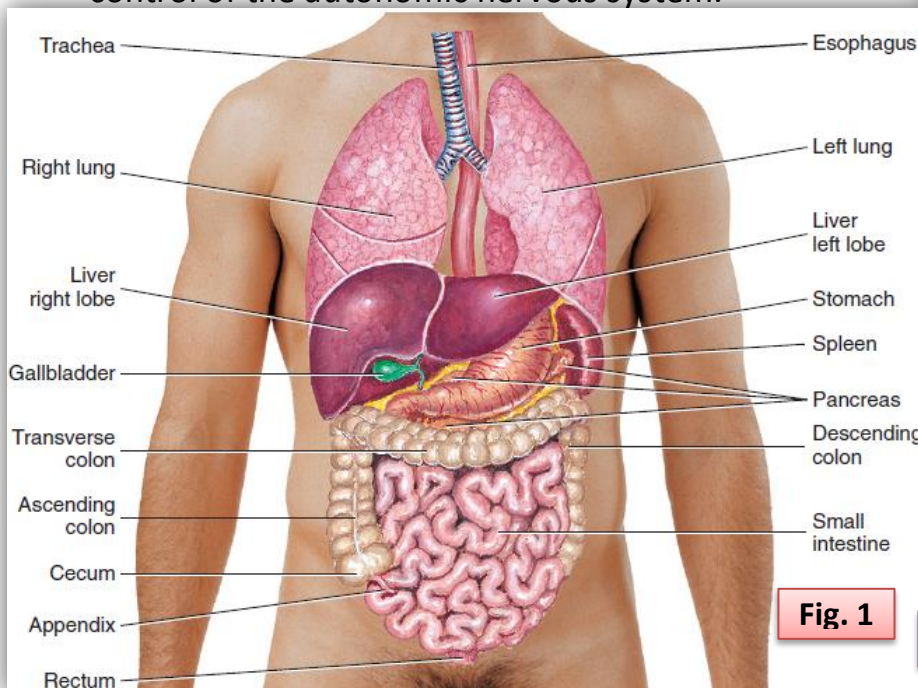


Fig. 1

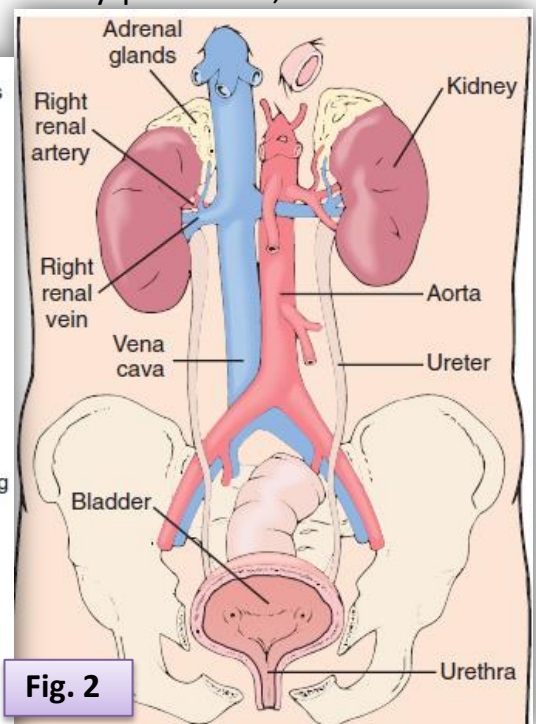


Fig. 2

Esophagus: The alimentary tract begins with the esophagus, a tube about 10 inches (25.4 cm) long connecting the pharynx to the stomach and extending just posterior to the trachea through the mediastinal cavity and diaphragm. The usual pH of the esophagus is between 6.0 and 8.0.

Stomach: The stomach is a hollow, flask-shaped, muscular organ located directly below the diaphragm in the left upper quadrant. Contents from the esophagus enter the stomach through the lower esophageal sphincter and mix with digestive enzymes and hydrochloric acid. Gastric acid continues the breakdown of carbohydrates that began in the mouth. Pepsin breaks down proteins, converting them to peptones and amino acids; and gastric lipase acts on emulsified fats to convert triglycerides to fatty acids and glycerol. The stomach also liquefies food into chyme and propels it into the duodenum of the small intestine. The usual pH of the stomach ranges from 2.0 to 4.0. The pyloric sphincter regulates the outflow of chyme into the duodenum.

Small Intestine: The longest section of the alimentary tract, the small intestine, is about 21 feet (6.4 m) long, beginning at the pyloric orifice and joining the large intestine at the ileocecal valve. In the small intestine ingested food is mixed, digested, and absorbed. The small intestine is divided into three segments: the duodenum, jejunum, and ileum. The duodenum occupies the first 1 foot (30 cm) of the small intestine and forms a C-shaped curve around the head of the pancreas. Absorption occurs through the intestinal villi of the duodenum, jejunum (8 feet [2.4 m] long), and ileum (12 feet [3.6 m] long). The ileocecal valve between the ileum and the large intestine prevents backward flow of fecal material (see Fig. 1).

Large Intestine (Colon) and Rectum: The large intestine is about 5 feet (1.5 m) long, consisting of cecum, appendix, colon, rectum, and anal canal. The ileal contents empty into the cecum through the ileocecal valve; the appendix extends from the base of the cecum. The colon is divided into three parts: ascending, transverse, and descending. The end of the descending colon turns medially and inferiorly to form the S-shaped sigmoid colon. The rectum extends from the sigmoid colon to the pelvic floor, where it continues as the anal canal, terminating at the anus. The large intestine absorbs water and electrolytes. Feces are formed in the large intestine and held until defecation (see Fig. 13-1).

ACCESSORY ORGANS: Accessory organs of the GI tract are the salivary glands, liver, gallbladder, and pancreas. Salivary glands are described below.

Liver: The liver is the largest organ in the body, weighing about 3.5 pounds (1.6 kg). It lies under the right diaphragm, spanning the upper quadrant of the abdomen from the fifth intercostal space to slightly below the costal margin (see Fig. 13-1). The rib cage covers a substantial portion of the liver; only the lower margin is exposed beneath it. The liver is divided into right and left lobes. This complex organ has a variety of functions, including the following:

- Bile production and secretion • Transfer of bilirubin from the blood (conjugated or direct) to the gallbladder (unconjugated or indirect)
- Protein, carbohydrate, and fat metabolism • Glucose storage in the form of glycogen • Production of clotting factors and fibrinogen • Synthesis of most plasma proteins (albumin and globulin) • Detoxification of a variety of substances, including drugs and alcohol • Storage of certain minerals (iron and copper) and vitamins (A, B12, and other B-complex vitamins).

Gallbladder: The gallbladder is a pear-shaped sac, 3 inches (7.6 cm) long, attached to the inferior surface of the liver (see Fig. 1). It concentrates and stores bile produced in the liver. The cystic duct combines with the hepatic duct to form the common bile duct, which drains bile into the duodenum. Bile contained in feces creates the characteristic brown color.

Pancreas: The pancreas lies in the upper left abdominal cavity, immediately under the left lobe of the liver, behind the stomach (see Fig. 1). It has both endocrine and exocrine functions. Endocrine secretions include the secretion of insulin, glucagon, somatostatin, and gastrin for carbohydrate metabolism. Exocrine secretions contain bicarbonate and pancreatic enzymes that flow into the duodenum to break down proteins, fats, and carbohydrates for absorption.

Spleen: The spleen is a highly vascular, concave, encapsulated organ about the size of a fist, situated in the upper left quadrant of the abdomen between the stomach and diaphragm. It is composed of two systems: the white pulp (consisting of lymphatic nodules and diffuse lymphatic tissue) and the red pulp (consisting of venous sinusoids) (see Fig. 1). Its main functions include the following:

- Storage of 1% to 2% of erythrocytes and platelets • Removal of old or agglutinated erythrocytes and platelets • Activation of B and T lymphocytes
- Production of erythrocytes during bone marrow depression.

URINARY TRACT: The urinary tract includes the kidneys, ureters, urinary bladder, and urethra. Together they remove water-soluble waste materials.

Kidneys: The kidneys are located in the posterior abdominal cavity on either side at the spinal levels T12 through L3, where they are covered by the peritoneum and attached to the posterior abdominal wall. Each kidney is partially protected by the ribs and a cushion of fat and fascia. The right kidney is slightly lower than the left because of displacement by the liver (see Fig. 2). Additional kidney functions include the following:

- (1) secretion of erythropoietin to stimulate red blood cell production;
- (2) Secretion of renin to activate the renin angiotensin- aldosterone system; and
- (3) Production of a biologically active form of vitamin D. The nephron regulates fluid and electrolyte balance through an elaborate microscopic filter and pressure system that eventually produces urine.

Ureters: The urine formed in the nephrons flows from the distal tubes and collecting ducts into the ureters and on into the bladder through peristaltic waves. Each ureter is composed of long, intertwining muscle bundles that extend for approximately 12 inches (30 cm) to insertion points at the base of the bladder (see Fig. 2).

Bladder: The bladder, a sac of smooth muscle fibers, is located behind the symphysis pubis in the anterior half of the pelvis (see Fig. 2). It contains an internal sphincter, which relaxes in response to a full bladder. Generally, when the urine volume of the bladder reaches about 300 mL, moderate distention is felt; a level of 450 mL causes discomfort. For voiding to occur, the external sphincter relaxes voluntarily; and urine exits through the urethra, which extends out of the base of the bladder to the external meatus.

VASCULATURE OF THE ABDOMEN: In the abdomen, the descending aorta travels through the diaphragm just to the left of midline until it branches into the two common iliac arteries approximately at the level of the umbilicus. Perfusion of the kidneys is provided by the right and left renal arteries, which branch off of the descending aorta. Blood is returned to the right side of the heart from the abdomen in the inferior vena cava, which parallels the abdominal aorta (see Fig. 2). Several veins empty into the inferior vena cava. These include the hepatic portal

system, which is composed of veins that drain the intestines, pancreas, stomach, and gallbladder; and the renal veins, which drain the kidneys and ureters.

GENERAL HEALTH HISTORY

- 1- **Present Health Status:**
- 2- **Past Health History:** (medical & surgical)
- 3- **Family History:**
- 4- **Personal and Psychosocial History:**

Physical examination (Abdominal)

Have patient in the supine position to start the examination. Approach the patient from the right side.

To do abdominal examination we will divide the abdomen to four areas called abdominal land mark (right upper quadrant (RUQ) to left upper quadrant (LUQ) to left lower quadrant (LLQ) and finally to right lower quadrant (RLQ)) see (Fig 3 and 4) and in each quadrant we can exam some organ (see Table 1).

Table 1

ANATOMIC CORRELATES OF THE QUADRANTS OF THE ABDOMEN

Right Upper Quadrant

Liver and gallbladder
Pylorus
Duodenum
Head of pancreas
Right adrenal gland
Portion of right kidney
Portions of ascending and transverse colon

Left Upper Quadrant

Left lobe of liver
Spleen
Stomach
Body of pancreas
Left adrenal gland
Portion of left kidney
Portions of transverse and descending colon

Right Lower Quadrant

Lower pole of right kidney
Cecum and appendix
Portion of ascending colon
Bladder (if distended)
Right ureter
Right ovary and salpinx
Uterus (if enlarged)
Right spermatic cord

Left Lower Quadrant

Lower pole of left kidney
Sigmoid colon
Portion of descending colon
Bladder (if distended)
Left ureter
Left ovary and salpinx
Uterus (if enlarged)
Left spermatic cord

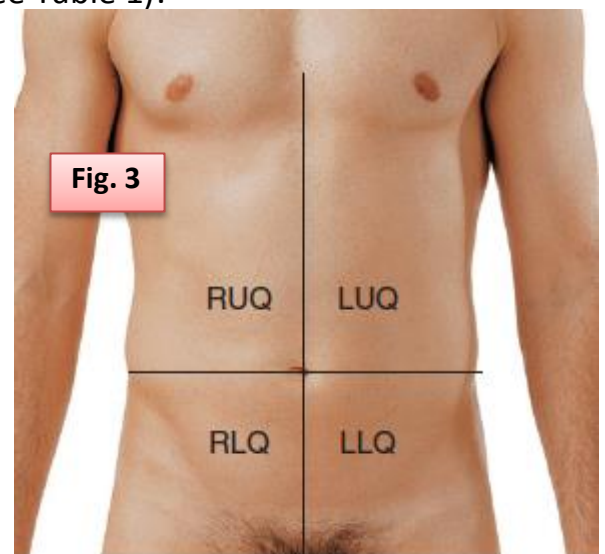


Fig. 3

Quadrants of the abdomen.

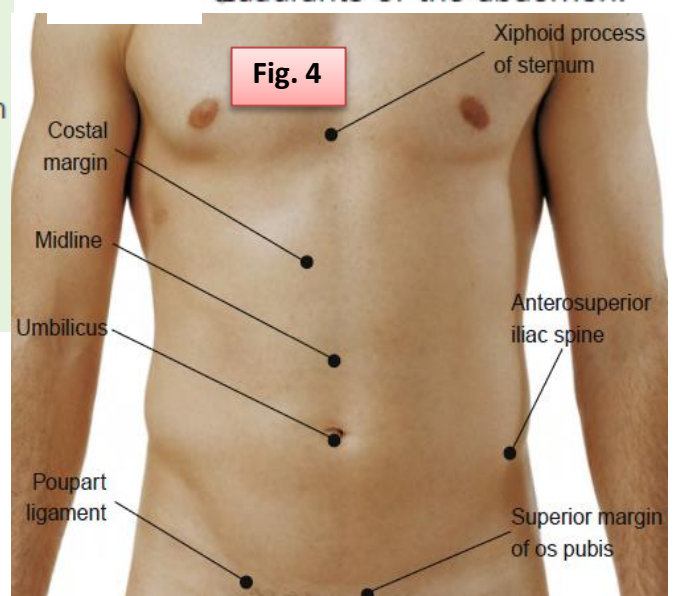


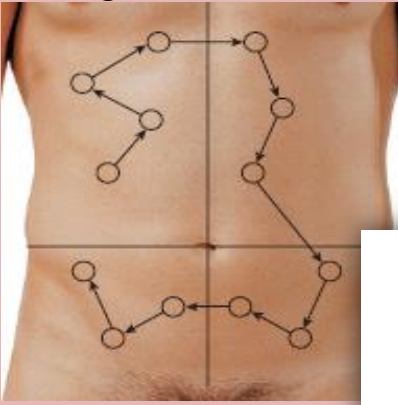
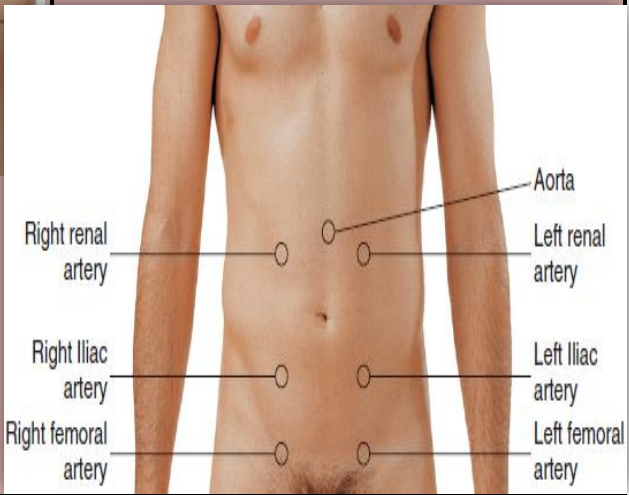


Fig. 4

Physical Exam	Normal finding	Abnormal finding
<p>INSPECT the abdomen for skin color, surface characteristics, venous patterns, contour, symmetry, and surface movements:</p> <p>*Direct a light source at a right angle to the patient's long axis.</p> <p>*With the patient lying supine, ask him or her to cough to increase intraabdominal pressure while you inspect for a sudden bulge, which is not expected. * note abdominal distention is</p> 	<p>*Skin color may be paler than other parts of the skin because of lack of exposure.</p> <p>*The umbilicus should be centrally located</p> <p>*Bulges during coughing indicate an abdominal hernia: ventral, umbilical, inguinal, or femoral.</p> 	<p>emaciation, obesity, distended abdomen, marked restlessness, a rigid posture, knees drawn up; facial grimacing, and rapid, uneven, or grunting respirations.</p> <p>*Patients with pancreatitis may prefer the knee-chest position; those with peritonitis or appendicitis may lie very still; those with colicky gallstones or ureteral stones may rock back and forth.</p> <p>*Jaundice indicates elevated serum bilirubin, erythema may indicate inflammation, bruises may indicate trauma or low platelet count, and striae may indicate abdominal distention.</p> <p>*Abdominal distention may result from: the "seven F's": fat (obesity), fetus (pregnancy), fluid (ascites), flatulence (gas), feces (constipation), fibroid tumor, or fatal tumor.</p>
<p>Auscultate Abdominal:</p> <p>1-Frequency and character of bowel sounds</p> <p>Auscultate <i>before</i> palpating and percussing the abdomen so the presence or absence of bowel sounds or pain is not altered.</p> <p>1-Use the diaphragm of the stethoscope and press lightly. Listen in a systematic progression, such as from (RUQ) to (LUQ) to (LLQ) and finally to (RLQ).</p> <p>2-Liver and spleen sound</p> <p>3- Auscultate with stethoscope bell:</p>	<p>1-(5-35) irregular clicks and gurgles per minute. Borborygmi, or increased sounds, may be because of hunger.</p>  <p>2- Silent.</p>	<p>1- Increased sounds unrelated to hunger and high pitched tinkling sounds may be caused by early intestinal obstruction; decreased or absent sounds after 5 min of listening may be associated with abdominal pain and rigidity.</p> <p>2- Friction rubs (high-pitched grating sound in association with respiration).</p> 

<p><u>A-Vascular sounds:</u> Listen with stethoscope bell in epigastric region, over aorta, and over renal, iliac, and femoral arteries (see Fig. above).</p> <p><u>B-Epigastric region and around umbilicus</u></p>	<p>3-A-No bruits (harsh or musical sound indicating blood flow turbulence), venous hum (soft, low-pitched, and continuous sound), or friction rubs.</p> <p>3-B- No venous hum.</p>	<p>3-A- Bruits in aortic, renal, iliac, or femoral arteries.</p> 
<p><u>palpate abdomen:</u></p> <p>1-Lightly palpate abdomen: Stand at patient's right side. Systematically palpate all quadrants, avoiding areas previously identified as problem spots. With palmar surface of fingers, depress abdominal wall up to 1 cm with light, even circular motion.</p> <p>2- Palpate abdomen with moderate pressure:</p> <p>Using same hand position as above, palpate all quadrants again, this time with moderate pressure.</p> <p>3- Deeply palpate abdomen</p> <p>With same hand position as above, repeat palpation in all quadrants or regions, pressing deeply and evenly into abdominal wall. Move fingers back and forth over abdominal contents. Use bimanual technique, exerting pressure with tow hand and concentrating on sensation with bottom hand, as shown in this figure, if obesity or muscular resistance makes deep palpation</p>	<p>1- Abdomen smooth with consistent softness. Possible tension from palpating too deeply, cold hands, or ticklishness.</p> <p>2- Soft, non-tender</p> <p>3- Possible sensation of abdominal wall sliding back and forth. Possible awareness of borders of rectus abdominis muscles, aorta, and portions of colon. Possible tenderness over cecum, sigmoid colon, and aorta and in midline near xiphoid process.</p>  	<p>1- Muscular tension or resistance, tenderness, or masses.</p> <p>2- Tenderness.</p> <p>3- Bulges, masses, tenderness unrelated to deep palpation of cecum, sigmoid colon, aorta, xiphoid process. Note location, size, shape, consistency, tenderness, pulsation, mobility, movement (with respiration) of any masses.</p>  <p>FIG. 13-8 Deep palpation of the abdomen.</p>  <p>FIG. 13-9 Deep bimanual palpation.</p>  <p>FIG. 13-10 Palpating the aorta.</p>

difficult. To help determine whether masses are superficial or intraabdominal, have patient lift head from examining table to contract abdominal muscles and obscure intraabdominal masses.

4- Umbilical ring and umbilicus: Palpate umbilical ring and around umbilicus. Note whether ring is incomplete or soft in center.

5- Liver: Place left hand under patient at eleventh and twelfth ribs, lifting to elevate liver toward abdominal wall. Place right hand on abdomen, fingers extended toward head with tips on right midclavicular line below level of liver dullness, as shown in figure at right. Alternatively, place right hand parallel to right costal margin, as shown in bottom figure at right. Press right hand gently but deeply in and up. Ask patient to breathe comfortably a few times and then take a deep breath. Feel for liver edge as diaphragm pushes it down. If palpable, repeat maneuver medially and laterally to costal margin.

6-Gallbladder: Palpate below liver margin at lateral border of rectus abdominis muscle.

7- Spleen: Still standing on right side, reach across patient with left hand, place it beneath patient over left costovertebral angle

4- Umbilical ring circular and free of irregularities. Umbilicus either slightly inverted or everted.



6- Gallbladder not palpable.

7- Spleen usually not palpable by either method.



4- Bulges, nodules, granulation. Protruding umbilicus.

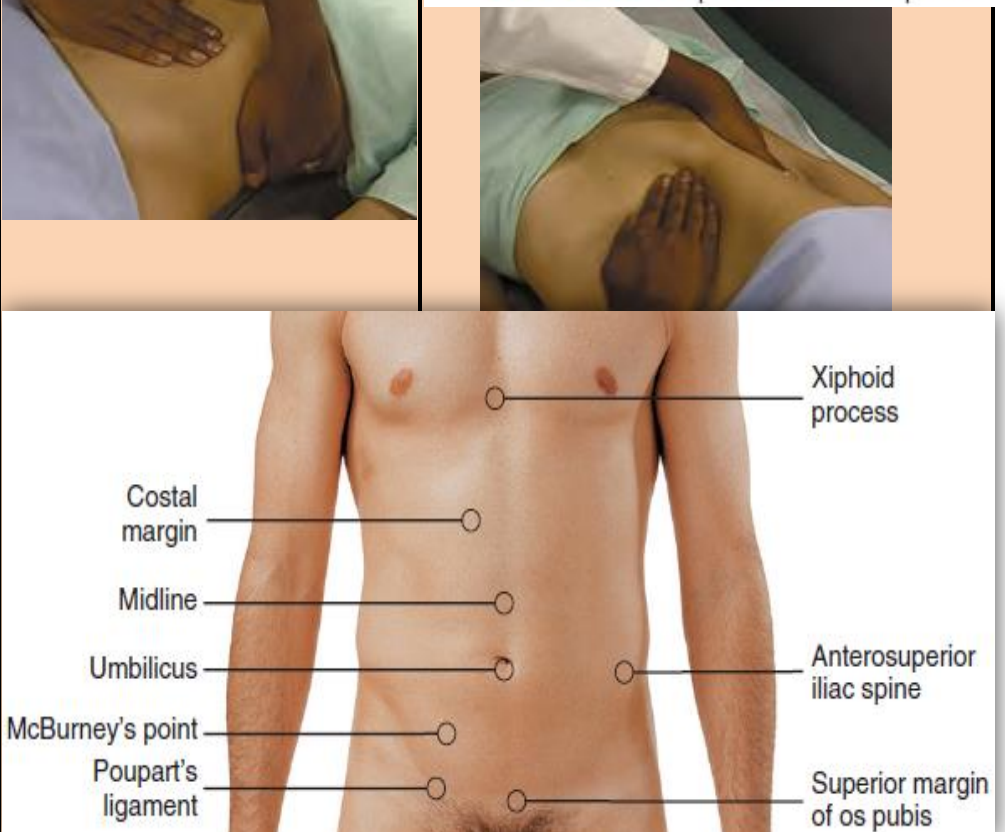


6- Palpable, tender. If tender (possible cholecystitis), palpate deeply during inspiration and observe for pain (Murphy sign).

7- Palpable spleen.



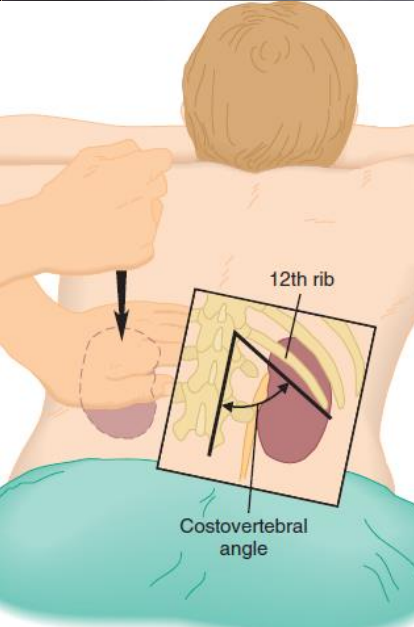
FIG. 13-15 Palpation of the spleen.



(CVA), and lift spleen anteriorly toward abdominal wall. As shown in figure at right, place right hand on abdomen below left costal margin and using findings from percussion gently press fingertips inward toward spleen while asking patient to take a deep breath. Feel for spleen as it moves downward toward fingers. Repeat with patient lying on right side, as shown in bottom figure at right, with hips and knees flexed. Press inward with left hand while using fingertips of right hand to feel edge of spleen.

8- Left kidney and Right kidney: Standing on patient's right or left, reach across with left hand, and place over left flank; then place right hand at patient's left costal margin. Ask patient to inhale deeply while you elevate left flank and palpate deeply with right hand.

8- Left kidney usually not palpable.



8- Tenderness.



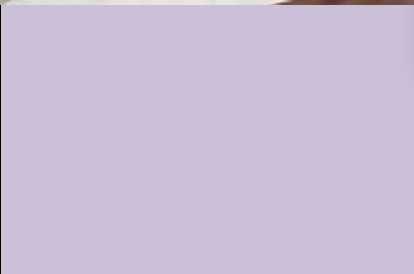
Test of abdominal pain:

1- Iliopsoas muscle test: Use test for suspected appendicitis. With patient supine, place hand over right lower thigh. Ask patient to raise leg, flexing at hip, while you push downward.

2



2- Obturator muscle test: Use test for suspected ruptured appendix or pelvic abscess. With patient supine, ask patient to flex right leg at hip and bend knee to 90



1- Right lower quadrant (RLQ) pain.



2-Pain in right hypogastric region.

degrees. Hold leg just above knee, grasp ankle, and rotate leg laterally and medially, as shown in figure.

3-Rebowend tenderness test: at beginning press deeply and gently into the RLQ of abdomen and then rapidly withdraw the hands and finger.

4-Fluid wave Test (Ascites test): strike on one side of the abdomen sharply with fingertips then feeling the impulse of a fluid wave with other hand. See figure on right side



3- Tenderness.



Percuss abdomen:

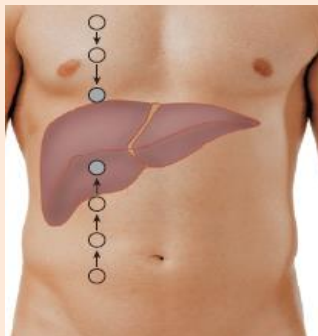
1-Tone: Percuss in all four quadrants or nine regions.

2- Liver span: To determine lower liver border, percuss upward at right midclavicular line, as shown in this figure, and mark with a pen where **tympany** changes to **dullness**. To determine upper liver border, percuss downward at right midclavicular line from an area of lung **resonance**, and mark change to **dullness**. Measure the distance between marks to estimate vertical span.

3- Spleen: Percuss just posterior to mid-axillary line on left, beginning at areas of lung **resonance** and moving in several

1-Tympany predominant. Dullness over organs and solid masses. Dullness in suprapubic area from distended bladder. See table on p. 136 for percussion notes.

2- Lower border usually begins at or slightly below costal margin. Upper border usually begins at fifth to seventh intercostal space. Span generally ranges from 6 to 12 cm in adults.



3- Small area of dullness from sixth to tenth rib. **Tympany** before and after deep breath.

1- Dullness predominant.

2- Lower liver border >2-3 cm below costal margin. Upper liver border above the fifth or below the seventh intercostal space. Span <6 cm or >12 cm.



3- Large area of dullness (check for full stomach or feces-filled intestine). Tone change from tympany to dullness with inspiration.

4- Dullness.

directions. Percuss lowest intercostal space in left anterior axillary line before and after patient takes deep breath.

4- Stomach: Percuss in area of left lower anterior rib cage and left epigastric region.

4- Tympany of gastric air bubble (lower than intestine tympany).

((see (Table 2) Some Causes of Pain Perceived in abdominal quadrant))



FIG. 13-13 Percussion of the spleen.

Some Causes of Pain Perceived in Anatomic Regions Table 2

Right Upper Quadrant

Duodenal ulcer
Hepatitis
Hepatomegaly
Lower lobe pneumonia
Cholecystitis

Right Lower Quadrant

Appendicitis
Salpingitis
Ovarian cyst
Tubo-ovarian abscess
Ruptured ectopic pregnancy
Renal/ureteral stone
Strangulated hernia
Meckel diverticulitis
Regional ileitis
Perforated cecum

Periumbilical

Intestinal obstruction
Acute pancreatitis
Early appendicitis

Periumbilical, cont'd

Mesenteric thrombosis
Aortic aneurysm
Diverticulitis

Left Upper Quadrant

Ruptured spleen
Gastric ulcer
Aortic aneurysm
Perforated colon
Lower lobe pneumonia

Left Lower Quadrant

Sigmoid diverticulitis
Salpingitis
Ovarian cyst
Ruptured ectopic pregnancy
Tubo-ovarian abscess
Renal/ureteral stone
Strangulated hernia
Perforated colon
Regional ileitis
Ulcerative colitis