ANSWERS: CHAPTER 8

MATCHING

1. c
2. i
3. h
4. a
5. d
6. e
7. b
8. f
9. g

IMAGE LABELING

1A. Stomach
1B. Gastrosplenic ligament
1C. Visceral peritoneum
1D. Parietal peritoneum
1E. Spleen
1F. Splenorenal ligament
1G. Left kidney
1H. Aorta
1I. IVC
2A. Spleen
2B. Diaphragm
2C. Splenic hilum
3A. Spleen
3B. Left kidney

MULTIPLE CHOICE

1. b 6. d 11. b 16. c
2. a 7. b 12. c 17. d
3. c 8. a 13. d 18. d
4. d 9. c 14. a 19. d
5. b 10. c 15. d 20. c

FILL-IN-THE-BLANK

1. Peritoneal; hilum
2. Stomach; left kidney; splenic flexure of the colon; pancreatic; diaphragm
3. Lienorenal; gastrosplenic; phrenicocolic
4. 12; 7; 3 to 4
5. Trabeculae
6. Red; white; white; red
7. Inferior mesenteric vein; neck; superior mesenteric vein
8. Asplenia
9. Accessory spleen
10. Filtering; worn-out; defective; platelets
11. Billroth
12. Immune; phagocytose
13. Diaphragm; left kidney
14. Splenorenal; left renal; IVC
15. Lymphoma; splenomegaly
16. Postinflammatory; traumatic; parasitic
17. Immunocompromised
18. Rupture; subcapsular; peritoneal; liquefaction
19. Hypoechoic; hyperechoic; splenomegaly; normal
20. Hemangioma

SHORT ANSWER

1. The red pulp is responsible for filtering the peripheral blood. It removes macrophages of ruptured, worn-out, or defective red blood cells; stores platelets and during fetal life produces red blood cells. The red pulp also removes sickle and thalassemic cells from circulation. If chronic anemia develops, the spleen can regain its hematopoietic function. The red pulp stores blood and can release this stored blood in cases of hemorrhage. The white pulp is part of the immune system and is a site of residence, proliferation, and differentiation of lymphocytes and mononuclear phagocytes. Bacteria are phagocytized in the white pulp.

2. Splenomegaly has many causes; the single most common cause is portal hypertension. Splenomegaly can be caused by infectious or inflammatory causes such as mononucleosis or endocarditis; congestive pathologies such as portal hypertension; infiltrative diseases such as in lymphoma; or hematologic, metabolic, and traumatic causes. The spleen is loosely held in place by three ligaments but does not have fixed peritoneal attachments. These loosely held ligaments allow the spleen to increase up to 10 times its normal size.

3. Most splenic abscesses are multiple and complex in appearance with mixed echogenic properties. Gas is frequently present in abscesses and will appear as a highly echogenic area with ring-down artifact or dirty shadowing. An air-fluid level may also be observed.

4. The spleen is one of the most frequently injured abdominal organs in cases of blunt abdominal trauma due to its vulnerable location in the LUQ. The spleen also holds a reservoir of blood, so damage to the spleen can cause significant hemorrhage. The tissue of the spleen is like a sponge and is easily damaged in cases of trauma. In a trauma situation, the spleen may shatter or fragment, hilar vessels may be disrupted, the parenchyma may be lacerated, or the capsule may tear. Sonographically, an evaluation for free fluid should be performed looking at the pelvis, both flanks, and Morrison’s pouch. The spleen may appear normal or, if there is a parenchymal hematoma, a mass may be visualized. Depending on the age of the bleed, the hematoma may be heterogeneous, isoechoic, anechoic, or hyperechoic. A hematoma may develop between the spleen and capsule, a subcapsular hematoma. If this occurs, a double contour can be seen. The hematoma may be isoechoic to the spleen...
and therefore difficult to visualize. An enlarging or heterogeneous spleen suggests rupture.

5. In patients with sickle cell disease, the spleen may have a variety of appearances. The spleen may appear normal. In children with acute splenic sequestration crisis, a large amount of blood pools within the spleen and the spleen may enlarge quickly. Splenomegaly may be present and hypoechoic areas may be seen within the parenchyma due to hemorrhage. With repeated crisis, splenic infarcts may occur and over time the spleen becomes shrunken.

**IMAGE EVALUATION/PATHOLOGY**

1. The arrow is pointing to an accessory spleen, which is a normal variant and asymptomatic in most cases. In cases of splenectomy, the accessory spleen can enlarge and take over the function of the removed spleen. In cases of hematologic disorders, this may cause a relapse in symptoms.

2. An irregular, hypoechoic collection is seen near the hilum of the spleen. Given the patient’s history of abdominal trauma, a hematoma is the most likely diagnosis. The remainder of the spleen should be evaluated as well as the splenic capsule to look for a subcapsular hematoma. The pelvis, the paracolic gutters, and Morrison’s pouch should be evaluated for free fluid. The hematocrit may be decreased in cases of hemorrhage.

3. A well-defined, hypoechoic, wedge-shaped lesion is seen within the splenic parenchyma. Given the patient’s history of sickle cell crisis, the most likely diagnosis is splenic infarct.

4. A large simple cyst is seen in the anterior portion of the spleen. Cysts of the spleen can either be primary or secondary. Secondary cysts include resolving hematoma or abscess. Parasitic cysts are also common in other parts of the world. Pseudocysts are also common.

5. The spleen appears grossly enlarged and the left kidney appears flattened. Ascites is seen surrounding the spleen. A large irregular hypoechoic mass is seen within the spleen. In cases of lymphoma, the spleen may appear normal sonographically or it may be diffusely enlarged. A focal mass may be seen and may appear hypoechoic or hyperechoic. Multiple nodules may also be seen.

**CASE STUDY**

1. The spleen is enlarged. The spleen is considered enlarged when its length exceeds 13 cm. With cirrhosis, the liver becomes fibrotic and the resistance to incoming blood flow increases. The pressure in the portal vein increases and flow may even reverse. As pressure in the portal vein increases, so does pressure in the splenic vein, causing congestion in the spleen. The hilum of the spleen and surrounding area should be evaluated for collateral varices. Dilated tortuous vessels may be seen in the splenic hilum from splenorenal collaterals.

2. Multiple hypoechoic lesions are seen throughout the spleen. Some of the lesions have a target appearance with a hyperechoic center. Given the patient’s history of cancer, metastatic disease is the most likely diagnosis. Fungal or microbacterial abscesses can occur in patients with immunocompromise. These lesions may appear as multiple hypoechoic or target lesions seen within the splenic parenchyma.