

**ANSWERS: Chapter 6**

**MATCHING**

1. g 5. a 9. k 13. f
2. i 6. l 10. b 14. e
3. m 7. n 11. j
4. d 8. c 12. h

**IMAGE LABELING**

1A. Right and left intrahepatic ducts
1B. Common hepatic duct
1C. Cystic duct
1D. Common bile duct
1E. Head of the pancreas
1F. Duodenum
1G. Gallbladder fundus
1H. Body of gallbladder
1I. Gallbladder neck
2A. Main lobar fissure
3A. Hepatic artery
3B. Common bile duct
3C. Portal vein
4A. Neck
4B. Body
4C. Fundus
5. Junctional fold

**MULTIPLE CHOICE**

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

**FILL-IN-THE-BLANK**

1. 7 to 10; 3
2. Main lobar fissure
3. Neck; body; fundus
4. Common hepatic duct; cystic duct
5. Concentrate; store
6. Hartman’s pouch
7. Direct; indirect
8. Sludge
9. Shadow; move
10. Gallstones; cholecystitis; porcelain
11. Color Doppler
12. Adenomyomatosis; cholesterosis
13. Courvoisier gallbladder
14. Hydropic gallbladder
15. RUQ pain; jaundice; fever; bilirubin; alkaline phosphatase
16. Inner; inner; 8
17. Color Doppler
18. Choledocholithiasis
19. Cholangiocarcinoma
20. Klatskin tumor

**SHORT ANSWER**

1. A false-positive examination occurs when a diagnosis of gallstones is made but the gallbladder is actually normal. This could occur if the ligamentum teres was mistaken for a contracted gallbladder filled with stones or shadowing from bowel gas was mistakenly identified as shadowing from gallstones. Edge shadowing from the gallbladder wall, shadowing from surgical clips, or shadowing from the spiral valves of Heister could all mimic shadowing caused by gallstones. A false-negative examination occurs when gallstones are present but are missed on the examination. This could occur if improper technique is used and the best possible pictures of the gallbladder are not obtained. Stones within a phrygian cap or Hartman’s pouch could be missed or small stones layered along the posterior wall may not be seen unless the patient’s position is changed.

2. The patient should be NPO for 6 to 8 hours prior to a gallbladder examination if at all possible. As with any examination, a thorough patient history should be obtained and the examination explained to the patient. The gallbladder evaluation begins with the patient in the supine position and sagittal and transverse images of the gallbladder are obtained, ensuring that the entire gallbladder is evaluated, including folds and anatomical variations. The area surrounding the gallbladder and porta hepatitis is evaluated. The CHD and CBD are evaluated along their entire length to the pancreatic head. The liver is evaluated for intrahepatic ductal dilatation. The thickness of the gallbladder wall and size of the CBD are noted. The gallbladder is always evaluated with the patient in at least two positions to evaluate for mobility or presence of gallstones. Typically, the supine position and left lateral decubitus or left posterior oblique positions are used. A right lateral decubitus, erect, or prone position may also be helpful. The gallbladder and ducts should be evaluated and representative images should be documented in the LLD position as well as the supine position.

3. A number of different techniques can be used to evaluate small gallstones and increase the visualization of shadowing. The gain and TGC settings should be evaluated first. Decreasing the gain can enhance the appearance of shadowing. Increasing the frequency can help, as can narrowing the sector width. Placing the focal zone at the area of interest is important. Finding a better window by scanning from a different angle or having the patient breathe differently can decrease the distance between the ultrasound beam and the stones.
4. Intrinsic wall thickening is caused by pathologies within the biliary system, such as cholecystitis, adenomyomatosis, polyps, or gallbladder carcinomas. Extrinsic wall thickening is the result of disease processes outside the biliary system, such as right sided heart failure, hepatitis, ascites, hypoalbuminemia, and AIDS.

5. Sonographically, both Courvoisier gallbladder and gallbladder hydrops appear as a thin-walled, distended, round gallbladder. With Courvoisier gallbladder, the CD may also be dilated. Courvoisier gallbladder is caused by an obstruction of the distal common bile duct, typically a mass in the head of the pancreas. Symptoms include a distended, palpable, nontender gallbladder in a jaundiced patient. A hydropic gallbladder is caused by an obstruction of the cystic duct or gallbladder neck by a gallstone. Patients may be asymptomatic or may present with RUQ pain, nausea, vomiting, and an RUQ mass.

### IMAGE EVALUATION/PATHOLOGY

1. Sludge; the patient could be turned onto his or her side to evaluate for movement of the sludge. As the patient turns, the sludge should move to the fundus of the gallbladder. Also, color Doppler could be used to evaluate for vascularity. A mass should demonstrate internal vascularity, whereas sludge will not.

2. Gallstone; Gallstones should be echogenic, produce a clean shadow, and be mobile, moving with change in the patient position.

3. Chronic cholecystitis; the gallbladder is contracted and filled with stones demonstrating the wall-echo-shadow sign. The arrow is pointing to the gallbladder wall. The E represents the echogenic gallstones filling the gallbladder lumen and the S represents the shadow created by the gallstones.

4. Thickened gallbladder wall; less than 3 mm; acute calculous cholecystitis

5. The gallbladder is filled with low-level echoes consistent with a sludge-filled gallbladder. When the gallbladder is filled with sludge and it blends into the liver parenchyma, it is called hepatization of the gallbladder. A sludge-filled gallbladder has many causes, including prolonged fasting, TPN, bile stasis or recent surgery.

### CASE STUDY

1. Adenomyomatosis; ring-down artifact; gallstones would be located in the dependent portion of the gallbladder, typically along the posterior wall not the anterior wall. Also, gallstones will move with a change in the patient position and gallstones should produce a clean shadow not a ring-down artifact.

2. Acute acalculous cholecystitis, which typically causes RUQ pain; a positive Murphy’s sign; nausea; vomiting; and possible fever and RUQ mass.