Gastrointestinal Radiology In-Training Test Questions for Diagnostic Radiology Residents

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1. Regarding barium sulfate contrast agents used for barium enema examinations, which one of the following is true?

   A. Double contrast barium enema examinations require high-density, high-viscosity barium formulations.
   B. Sedimentation is less of a problem when the barium suspension is diluted.
   C. Single contrast barium enema examinations use barium formulations with 60-80% w/v composition.
   D. A 40% weight-to-volume (w/v) barium suspension is made by adding 40 g of barium sulfate to 100 mL of water.

Rationales:

A. **Correct**. Double contrast UGI examinations require high-density, low-viscosity barium formulations.
B. *Incorrect*. Sedimentation may occur more readily with dilution, because the sedimentation rate depends in part on the amount and type of additives.
C. *Incorrect*. Single contrast barium enema examination uses barium formulations with 20-25% w/v composition.
D. *Incorrect.* A 40% weight-to-volume (w/v) barium suspension is made by adding 40 g of barium sulfate to enough water to obtain a total volume of 100 mL.

Citations:

Skucas J. Contrast Media. Gore RM, Levine MS, Laufer I, eds. Textbook of Gastrointestinal Radiology Vol. 1. W.B. Saunders Co., Philadelphia, PA, 1994. pp.17.

2. Concerning selective immunoglobulin A deficiency, which one is TRUE?

    A. It is an uncommon immunodeficiency in adults.
    B. The majority of persons with IgA deficiency will present with malabsorption.
    C. It is not associated with celiac disease.
    D. It carries an increased risk of malignancy.

Rationales:
A. *Incorrect.* It is the most common immunodeficiency in adults, occurring in 1 in 700 persons.
B. *Incorrect.* Most are asymptomatic because of a compensatory rise in IgM production. The remainder will be symptomatic and may respond favorably to a gluten-free diet.
C. *Incorrect.* It has been reported in 1 in 40 patients with celiac disease.
D. **Correct.** Malignant tumors are more common in patients with IgA deficiency and in patients with other immunodeficiencies.

Citations:
Brooks FP, Herlinger H. Role of the small intestine in immunity. In: Gore RM, Levine MS, Laufer I, eds. Textbook of Gastrointestinal Radiology, Vol. 1. Philadelphia, PA: W.B. Saunders Company, 1994:821.

3. Concerning Crohn's disease, which one is TRUE?

    A. In the United States, ulcerative colitis is less common than Crohn's disease.
    B. Ulcerative colitis can affect any part of the alimentary tract.
    C. Crohn's disease is limited to the mucosa of the gastrointestinal tract.
    D. Crohn's disease does not contiguously affect the bowel.

Rationales:

A. *Incorrect.* Among the general population of the United States, ulcerative colitis is more common than Crohn's disease. The incidence of ulcerative colitis is 11 per 100,000. The incidence of Crohn's disease is about 7 per 100,000.

B. *Incorrect.* Crohn's disease can affect any part of the gastrointestinal tract, from the mouth to the anus. About 75% of Crohn's patients will have disease of the small intestine, without or with concomitant disease elsewhere. Of all patients with small intestinal Crohn's, 90% have involvement of the terminal ileum. Ulcerative colitis affects the colon. The terminal ileum can be secondarily affected, backwash ileitis.

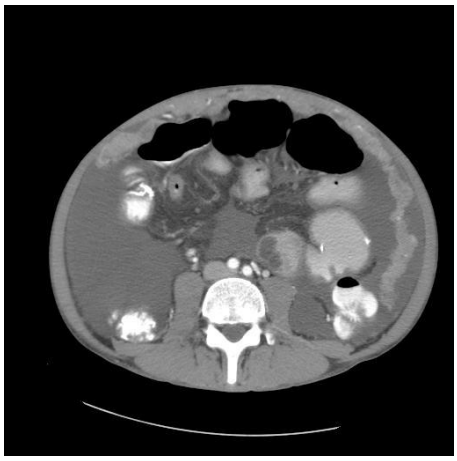
C. *Incorrect.* Crohn's disease is associated with transmural inflammation of the bowel wall. At histology, noncaseating granulomas can be found throughout all layers, from the mucosa to the serosa.Granulomas, lymphoid aggregates, inflammatory changes and fissures can penetrate through the bowel wall to involve the adjacent mesentery (fibrofatty change) and mesenteric lymph nodes.

D. **Correct.** Crohn's disease tends to have a discontinuous distribution. Lengths of involved gut will have disease free segments or "skip areas". Crohn's disease often spares the rectum. This contrasts with ulcerative colitis, in which the rectum is almost always involved. In ulcerative colitis, disease extends upstream from the rectum and is continuous, without intervening normal segments.

Citations:

Friedman S and Blumberg RS. Inflammatory bowel disease. In: Braunwald E, Fauci AS, Kasper DL, et al, eds. Harrison's Principles of Internal Medicine, Fifteenth Edition. New York, NY: McGraw-Hill, 2001:1679-1692.

4. You are shown an image from an abdominal CT (Figure 3) performed in a 42 year-old man with a long history of Crohn's disease, who now presents with abdominal pain and distention. What is the MOST LIKELY diagnosis?



   A. Crohn's colitis
   B. Metastatic adenocarcinoma
   C. Abscess perforation with peritonitis
   D. Small bowel obstruction

Rationales:

A. *Incorrect*. The ascending and descending colon are opacified by oral contrast and are unremarkable. The irregular band of soft tissue density in the anterior periphery of the peritoneal cavity is an omental cake.

B. **Correct**. The images show ascites and an omental cake compatible with peritoneal carcinomatosis. The most likely primary in a male patient of this age with this history of Crohn's disease is a small bowel adenocarcinoma. The heterogeneous mass anterolateral to the left iliac vessels is a surgically proven ileal adenocarcinoma, though I would not expect the observer to recognize this from this single image. "The risk for the development of small bowel adenocarcinoma is greater in patients with Crohn's disease than in the general population although the magnitude of this increased risk is unclear. Risk factors associated with the development of small bowel carcinoma in Crohn's disease include male sex, duration of disease, associated fistulous disease, and the presence of surgically excluded loops of bowel. Crohn's colitis has been associated with an increased risk of colorectal carcinoma in patients with long-standing colitis, strictures, fistulae, and right-sided colonic disease." (1)

C. *Incorrect.* While intraperitoneal perforation of abscess with infection may complicate Crohn's disease, this is extremely rare. While it would cause free fluid, it would not cause an omental cake.

D. *Incorrect*. While small bowel obstruction may complicate Crohn's disease, the bowel dilatation in this patient is due to short gut and not obstruction. It does not account for the signs of peritoneal carcinomatosis.

Citations:

Bernstein D, Rogers A. Malignancy in Crohn's disease. Am J Gastroenterol 1996;91(3):434-40.

Greenstein AJ, Sachar DB, Mann D, et al. Spontaneous free perforation and perforated abscess in 30 patients with Crohn's disease. Ann Surg 1987;205(1):72-6.

5. Regarding internal hernias, which of the following is TRUE?

A. They can often be managed with NG tube decompression.
B. Transmesenteric hernias in children are usually due to trauma.
C. Pericecal hernias account for 13% of internal hernias.
D. Broad ligament hernias usually involve the sigmoid colon.

Rationales:

A. *Incorrect*. These are closed-loop obstructions that require surgical repair. They most commonly present as a strangulated small bowel obstruction.
B. *Incorrect*. Transmesenteric hernias in children are usually due to a congenital mesenteric defect.
C. **Correct.**
D. *Incorrect*. Broad ligament hernias usually involve the small bowel.

Citations:

Takeyama N, Gokan T, Ohgiya Y, et al. CT of internal hernias. RadioGraphics 2005; 25:997-1015

6. Concerning acute pancreatitis, which of the following is TRUE?

A. The degree of pancreatic necrosis is best prognostic indicator.
B. Severe acute pancreatitis is found in approximately 50% of patients.
C. It is commonly caused by hypertriglyceridemia in the United States.
D. The initial diagnostic test should be abdominal ultrasonography.

Rationales:

A. **Correct.** The degree of pancreatic necrosis corresponds to the severity of the patient's acute pancreatitis episode. Early assessment is critical for predicting which patients are likely to suffer lethal attacks, which occur in 2-10% of cases. The increased frequency of death in acute pancreatitis is directly correlated with the development and extent of pancreatic necrosis.

B. *Incorrect.* Of all patients who present with acute pancreatitis, 70-80% have mild episodes and 20-30% have severe attacks.

C. *Incorrect*. Acute pancreatitis in the U.S. is most commonly associated with choledocholithiasis and ethanol abuse, with other etiologic factors such as metabolic disorders (hypercalcemia and hyperlipidemia), trauma, including ERCP-induced pancreatitis, medications (azathioprine, sulfonamides), and structural abnormalities such as pancreas divisum and tumors being much less common.

D. *Incorrect*. Abdominal ultrasound should not be the first diagnostic test ordered for patients presenting to the emergency department with acute pancreatitis. Dynamic contrast enhanced CT (creatinine permitting) is the diagnostic test of choice because it allows characterization of the inflammation and calculation of the degree of pancreatic glandular necrosis (see A above).

Citations:

Balthazar EJ. Acute pancreatitis: assessment of severity with clinical and CT evaluation. Radiology 2002; 223:603-613.

Mortele KJ, Weisner W, Intriere L, et al. A modified CT Severity Index for evaluating acute pancreatitis: improved correlation with patient outcome. AJR 2004;183:1261-1265.

7. Concerning angiosarcoma of the spleen, which one of the following is TRUE?

A. The spleen is not typically enlarged.
B. Malignant fibrous histiocytoma is more common than angiosarcoma.
C. Spontaneous rupture occurs in approximately 10% of patients.
D. Prognosis is very poor with only 20% survival rate at 6 months.

Rationales:

A. *Incorrect*. The spleen is usually enlarged.
B. *Incorrect*. Angiosarcoma is the most common non-lymphoid primary malignant of the spleen.
C. *Incorrect*. Spontaneous rupture occurs in 30%, not 10%.
D. **Correct.** The prognosis is very poor.

Citations:

Mortele KJ, Mergo PJ, Kunnen M, Ros PR. Tumoral Pathology of the Spleen. In: Baert AL, Heuck FHW, Youker JE, eds. Medical Imaging of the Spleen. Berlin: Springer 2000;101-122.

8. Concerning Peutz-Jeghers Syndrome, which one of the following is TRUE?

A. It is an autosomal-recessive inherited trait.
B. It is associated with a high risk for the development of adenocarcinoma of the pancreas.
C. It represents 50% of hereditary gastrointestinal polyposis syndromes.
D. Approximately 80% of patients have gastric polyps.

Rationales:
A. *Incorrect*. Peutz-Jeghers is inherited as an autosomal dominate trait.
B. **Correct**. There is an increased risk of a number of malignancies.
C. *Incorrect*. It represents about 10% of the hereditary polyposis syndromes.
D. *Incorrect*. Approximated 30% of patients have gastric polyps.

Citations:
Gourtsoyiannis NC, Nolan DJ. Polyposis Syndromes. In: Gourtsoyiannis NC, Nolan DJ, eds. Imaging of Small Intestinal Tumours. Amsterdam: Elsevier 1997;213-229.

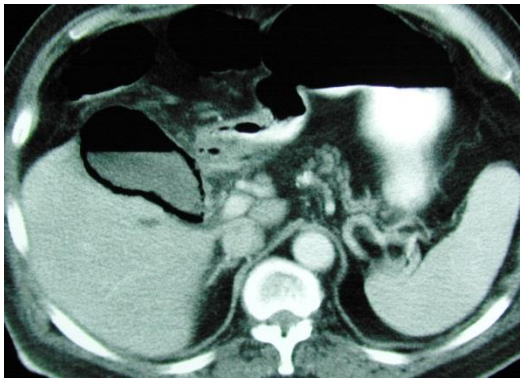
9. What of the following is associated with primary sclerosing cholangitis (PSC)?

A. Cholangiocarcinoma
B. Choledochal cyst
C. Choledochocele
D. Recurrent pyogenic cholangitis

Rationales:

A. **Correct**. Primary sclerosing cholangitis (PSC) is a significant risk factor for cholangiocarcinoma. Among patients with PSC, the lifetime risk of cholangiocarcinoma is 10-15%, with an annual risk of 1.0-1.5%.
B. *Incorrect*. Choledochal cyst is considered to be congenital in etiology. It is postulated to be related to anomalous development of the junction between the common bile duct and the pancreatic duct. In patients with pancreaticobiliary maljunction (PBM), gallbladder cancers occur in 15% and bile duct cancers occur in 5%. However, carcinogenesis in patients with choledochal cyst or PBM is not related to PSC.
C. *Incorrect*. Most authors consider a choledochocele to be a Type III choledochal cyst. As such, it is not related to PSC.
D. *Incorrect*. Recurrent pyogenic cholangitis (Oriental cholangiohepatitis) is an infectious disease, with no particular association with PSC.

10. A 78-year-old male presents with severe, acute abdominal pain. Based on the CT image provided, which of the following underlying disorders does the patient most likely have?



A. Chemotherapy-induced immunosuppression.
B. Adenomyomatosis
C. Diabetes mellitus
D. Acute cholangitis

Rationales:

A. *Incorrect.* Immunosuppression is not a predisposing factor for emphysematous cholecystitis.
B. *Incorrect*. Adenomyomatosis is one type of hyperplastic cholecystosis. It is a hyperplastic condition associated with focal, circumferential or generalized gallbladder wall thickening. It is associated with intramural diverticula called Aschoff-Rokitansky sinuses which can contain cholesterol crystals and form microabscesses. It does not predispose to emphysematous cholecystitis.
C. **Correct**. Most patients with emphysematous cholecystitis are elderly, diabetic males.
D. *Incorrect*. There is no predisposition to emphysematous cholecystitis in patients with acute cholangitis.