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Question: 1072

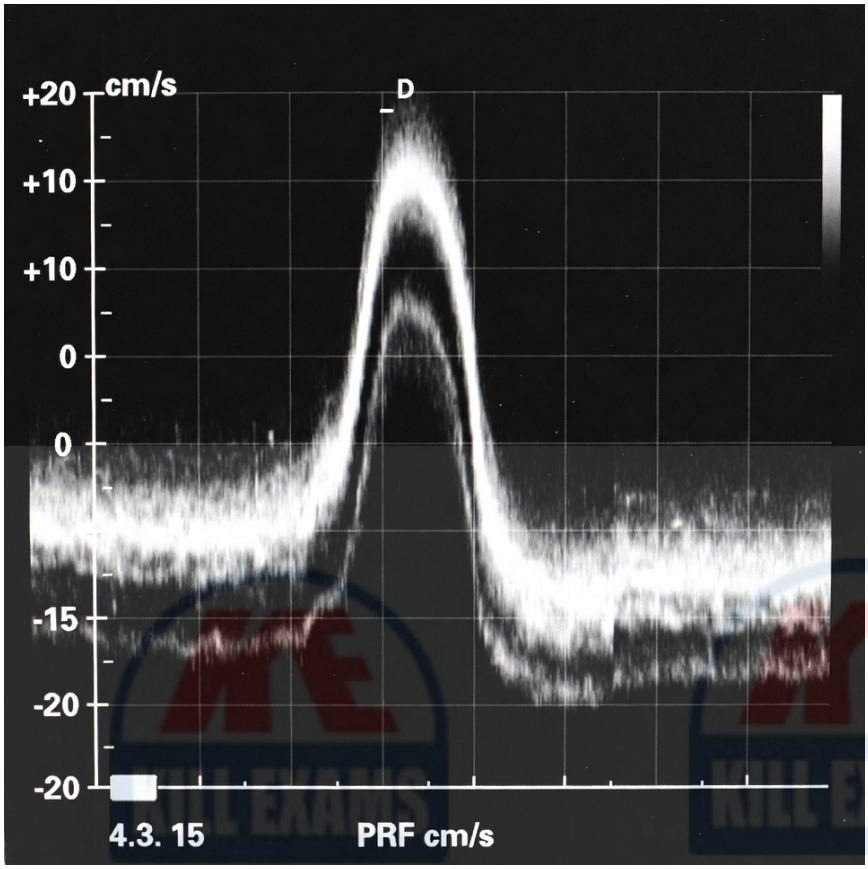
A patient presents with a history of epigastric pain and weight loss. Ultrasound reveals a bulky, hypoechoic mass in the head of the pancreas. You also note that the common bile duct measures 12 mm and the pancreatic duct measures 5 mm. This combination of findings is known as:

A. Double duct sign
B. Murphy sign
C. WES sign
D. Courvoisier sign

Answer: A
Explanation: The "double duct sign" refers to the simultaneous dilatation of the common bile duct and the main pancreatic duct. It is most commonly caused by a malignancy in the head of the pancreas that obstructs both structures at their distal confluence.

Question: 1073

A 65-year-old male with a history of chronic alcoholism and suspected cirrhosis is referred for a portal hypertension study. While performing a spectral Doppler evaluation of the main portal vein, you observe significant spectral aliasing despite having the scale (PRF) at its maximum setting for the current depth. The transducer being used is a 4.0 MHz curvilinear array. To accurately calculate the peak systolic velocity and determine the direction of flow without changing the transducer, which adjustment would be the most effective for optimizing the pulsed wave Doppler display?



A. Shift the baseline to the top of the spectral display
B. Lower the wall filter setting to 50 Hz
C. Decrease the Doppler transmit frequency to 2.5 MHz
D. Increase the Doppler steering angle to 60 degrees

Answer: C
Explanation: In the context of Pulsed Wave Doppler, the Nyquist limit is defined as $PRF / 2$. When the Doppler shift exceeds this limit, aliasing occurs. Since the Doppler shift is directly proportional to the transmitted frequency ($f_d = 2 \cdot f_t \cdot v \cdot \cos(\theta) / c$), decreasing the transmit frequency from 4.0 MHz to 2.5 MHz reduces the Doppler shift for the same blood velocity, potentially bringing the peak frequency shift back under the Nyquist limit. Shifting the baseline only visually rearranges the wrap-around but does not increase the maximum detectable velocity if the total peak-to-peak shift exceeds the PR**F.** Increasing the steering angle to 60 degrees would technically lower the shift (due to the cosine function), but lowering the transmit frequency is the primary equipment optimization step for penetration and high-velocity states in deep abdominal imaging.

Question: 1074

A patient three weeks post-liver transplant presents with increasing abdominal girth and jaundice. Ultrasound reveals a large, well-defined, multiloculated fluid collection in the right upper quadrant near the porta hepatis. Aspiration of the fluid shows a high concentration of bilirubin. What is the most likely

postoperative complication?

A. Biloma
B. Hematoma
C. Seroma
D. Abscess

Answer: A
Explanation: A biloma is a common complication following liver transplantation, often occurring due to biliary leakage at the anastomosis or ischemic necrosis of the bile ducts; it typically appears as a localized, frequently multiloculated fluid collection near the biliary tree or porta hepatis.

Question: 1075

A 58-year-old hypertensive male has renal duplex showing normal main renal artery velocities (PSV 145 cm/s, RAR 2.1). However, a segmental lower pole artery demonstrates focal color aliasing with PSV 365 cm/s and turbulent spectral broadening. Distal to this segment, the intrarenal waveform shows tardus-parvus configuration with acceleration time 0.12 s. Which finding confirms hemodynamically significant segmental renal artery stenosis?

A. Resistive index >0.85 throughout
B. Normal main artery velocities with no distal changes
C. Low renal-aortic ratio
D. Focal high PSV (>300 cm/s) in a segmental artery with post-stenotic tardus-parvus waveform

Answer: D
Explanation: Segmental renal artery stenosis is diagnosed by localized high-velocity flow (>200–300 cm/s) with turbulence at the stenotic segment on color/spectral Doppler, accompanied by distal tardus-parvus waveform (prolonged acceleration time >0.08–0.10 s) in the affected branch territory, even when the main renal artery appears normal.

Question: 1076

During a difficult ultrasound-guided cholecystostomy tube placement in a critically ill patient, the sonographer struggles to visualize the needle tip due to the patient's large body habitus and overlying bowel gas. Which adjustment would most likely improve needle tip visualization?

A. Decrease the overall gain and turn off tissue harmonics
B. Use a needle with an echogenic tip and "rock" the needle slightly while the clinician advances it
C. Increase the dynamic range to create a smoother image
D. Use the highest frequency transducer available regardless of penetration

Answer: B
Explanation: For deep procedures or difficult-to-image patients, utilizing needles with laser-etched echogenic tips enhances the reflection of the ultrasound beam. Additionally, a slight "rocking" or jiggling motion of the needle causes a temporal change in the pixels on the display, making the movement of the needle tip much more apparent to the sonographer and clinician.

Question: 1077

A patient with chronic kidney disease shows bilateral kidneys measuring 8.5 cm with increased echogenicity and RI of 0.82 in interlobar arteries. Which value most specifically reflects irreversible parenchymal damage?

A. PSV >200 cm/s
B. Absent diastolic flow
C. RI <0.70
D. RI >0.80

Answer: D
Explanation: RI >0.80 most specifically reflects irreversible parenchymal damage, as elevated intrarenal resistance from fibrosis, glomerulosclerosis, and tubular atrophy reduces diastolic flow in advanced medical renal disease.

Question: 1078

A renal transplant patient develops significant leg edema on the side of the transplant three weeks postoperatively. Ultrasound shows a large, anechoic, non-pulsatile fluid collection with thin septations located between the lower pole of the kidney and the urinary bladder. The collection is causing mild hydronephrosis. What is the most likely diagnosis?

A. Hematoma
B. Urinoma
C. Lymphocele
D. Seroma

Answer: C
Explanation: Lymphoceles are common late-stage (weeks to months) fluid collections following renal transplant, caused by the disruption of pelvic lymphatics; they often present with pressure symptoms such as leg edema or hydronephrosis.

Question: 1079

A 75-year-old male former smoker with known peripheral artery disease and hypertension undergoes surveillance duplex ultrasound for a previously identified infrarenal abdominal aortic aneurysm. The maximum anterior-posterior diameter measures 5.95 cm with a large circumferential heterogeneous mural thrombus occupying >60% of the lumen cross-section. Color Doppler demonstrates turbulent, bidirectional swirling flow within the residual patent lumen and peak systolic velocity of 140 cm/s at the proximal aneurysm neck. Per current 2024 Society for Vascular Surgery practice guidelines for asymptomatic infrarenal AAA management, what is the dominant sonographic criterion indicating referral for elective endovascular or open repair in this patient?

A. Turbulent bidirectional flow pattern throughout the aneurysm sac
B. Circumferential mural thrombus occupying >50% of the lumen
C. Maximum cross-sectional diameter ≥5.5 cm in a male patient
D. Peak systolic velocity >130 cm/s at the aneurysm neck

Answer: C
Explanation: For asymptomatic infrarenal abdominal aortic aneurysms in men, the primary and most evidence-based threshold for elective repair remains a maximum diameter of 5.5 cm or greater, based on randomized trial data demonstrating significantly increased annual rupture risk (approximately 5–15% per year) above this size. Diameter measurement is prioritized over thrombus burden, flow turbulence, or velocity characteristics unless rapid growth (>1 cm/year) or symptomatic presentation is also present.

Question: 1080

A 58-year-old female with a history of breast cancer and recent chemotherapy presents with right upper quadrant pain. Sonography shows a "starry sky" appearance of the liver (diffuse tiny bright foci) and gallbladder wall thickening. Laboratory results show a low white blood cell count. This sonographic pattern is most commonly associated with:

A. Acute hepatitis
B. Portal vein gas
C. Hepatic candidiasis
D. Fatty liver infiltration

Answer: A
Explanation: The "starry sky" appearance refers to the increased echogenicity of the portal vein walls against a background of decreased liver parenchymal echogenicity, which is a classic, though non-specific, sign of acute hepatitis.

Question: 1081

An ultrasound of the spleen in a patient with sickle cell anemia reveals a very small, echogenic, shrunken spleen with multiple calcifications.

A. Splenic congestion
B. Splenic hamartoma
C. Splenomegaly
D. Autosplenectomy

Answer: D
Explanation: In sickle cell anemia, recurrent splenic infarctions over time lead to fibrosis and shrinkage of the organ, a process known as autosplenectomy. The spleen becomes small, hard, and often calcified, eventually becoming difficult to visualize on ultrasound.

Question: 1082

A 38-year-old female complains of recurrent right submandibular painful swelling exacerbated postprandially for 6 months. Ultrasound shows submandibular gland enlargement (2.8 cm AP), dilated main duct to 4.2 mm proximally, and an 8 mm echogenic focus with clean posterior shadowing at the ductal orifice near floor of mouth. No gland vascularity increase. What is the primary finding?

A. Ranula as plunging cystic collection without stone
B. Sialolithiasis with proximal duct dilation 4 mm and echogenic calculus with shadowing
C. Acute viral parotitis with diffuse gland hypoechogenicity
D. Mucocele with anechoic extravasation

Answer: B
Explanation: Submandibular sialolithiasis causes obstructive symptoms (mealtime pain/swelling) with proximal duct dilation (>3 mm significant), echogenic calculus with posterior shadowing at Wharton's duct orifice or intraglandular, and gland enlargement/edema. Ultrasound is first-line for detection (high sensitivity for stones >2-3 mm), guiding sialendoscopy or excision.

Question: 1083

A 40-year-old male with Crohn's disease has RLQ pain and elevated CRP. Ultrasound shows thickened terminal ileum with hyperemia. Prior MRI confirmed inflammation. The sonographer documents:

A. Creeping fat sign
B. Fistula tract
C. Abscess presence
D. Bowel wall stratification

Answer: D
Explanation: Documenting bowel wall stratification assesses transmural involvement, integrating inflammatory markers with real-time localization.

Question: 1084

During urinary system assessment, bladder volume is 520 mL pre-void with post-void residual of 180 mL. Prostate volume is 55 mL. Which parameter most indicates outlet obstruction?

A. Post-void residual of 180 mL
B. Urinary system context
C. Prostate volume of 55 mL
D. Bladder volume of 520 mL

Answer: A
Explanation: Post-void residual of 180 mL most indicates outlet obstruction, as significant retention reflects impaired emptying from mechanical or functional blockage.

Question: 1085

In the operating room during intraoperative ultrasound-guided cholecystostomy tube placement, the surgeon requests real-time guidance. The patient has unexpected bowel interposition. How should the sonographer adapt the protocol?

A. Use color Doppler only
B. Cancel the procedure
C. Switch to a different acoustic window, adjust patient position, and use graded compression to displace bowel
D. Proceed without change

Answer: C
Explanation: The ability to adapt protocol due to different circumstances is essential; the sonographer modifies scanning technique by changing acoustic windows, repositioning the patient, or applying graded compression to optimize visualization and provide safe ultrasound guidance during interventional procedures.

Question: 1086

In a renal transplant 9 months postoperatively, the graft shows cortical thinning and RI of 0.78 with

monophasic waveforms. What is the most likely long-term complication?

A. Obstruction
B. ATN
C. Acute rejection
D. Chronic rejection

Answer: D
Explanation: Chronic rejection or chronic allograft nephropathy presents with progressive cortical thinning, increased echogenicity, and persistently elevated or borderline RI with monophasic waveforms reflecting microvascular disease and fibrosis.

Question: 1087

You are performing a Doppler study on a patient with suspected Nutcracker syndrome. To document the severity of the compression, you should compare the Peak Systolic Velocity (PSV) of the left renal vein (LRV) at the point of compression to the PSV of the LRV at the renal hilum. A ratio of greater than ____ is typically used as a diagnostic threshold.

A. 3:1
B. 5:1
C. 10:1
D. 2:1

Answer: B
Explanation: In Nutcracker syndrome, the compression of the left renal vein between the SMA and aorta causes a significant pressure gradient. A PSV ratio of >5.0 (comparing the narrowed segment to the hilar segment) is a commonly accepted sonographic criterion for diagnosing significant entrapment.

Question: 1088

A 45-year-old male presents with epigastric pain. The sonographer identifies a "target" or "pseudokidney" sign in the left upper quadrant, consisting of concentric rings of varying echogenicity. What is the most likely diagnosis?

A. Volvulus
B. Gastric bezoar
C. Pyloric stenosis
D. Intussusception

Answer: D

Explanation: The "target" or "pseudokidney" sign is the sonographic hallmark of intussusception, where one segment of the bowel prolapses into another. The concentric rings represent the layers of the bowel wall and the mesenteric fat trapped between them.

Question: 1089

In an effort to eliminate aliasing in the hepatic artery, a sonographer increases the PR**F.** However, they notice that the color flow now appears only in the very center of the vessel and is absent near the walls. What is the likely cause of this?

A. There is a mirror image artifact occurring
B. The velocity of the blood at the walls has become zero
C. The PRF is now so high that the Doppler shifts from slower peripheral flow are below the wall filter
D. The PRF is too low to detect the peripheral flow

Answer: C
Explanation: In most systems, the wall filter (which removes low-frequency shifts caused by vessel wall motion) is automatically increased when the PRF (scale) is increased. If the PRF is set too high, the wall filter may also become high enough to "filter out" the legitimate, slower blood flow near the vessel walls, resulting in a color display only in the center of the vessel where velocities are highest.

Question: 1090

During a renal transplant exam, the sonographer notes that the kidney is located in the right iliac fossa. To optimize the image of the deeply located renal artery anastomosis, which adjustment is most effective?

A. Decreasing the Doppler gain
B. Switching to a linear array transducer
C. Increasing the transducer frequency
D. Moving the focus deeper

Answer: D
Explanation: Placing the focal zone at or slightly below the level of the vessel of interest (the renal artery anastomosis) optimizes lateral resolution and beam intensity at that depth, which is essential for accurate spectral Doppler in deeper transplant grafts.

Question: 1091

A 50-year-old male with a history of alcohol abuse presents with severe epigastric pain radiating to the back. Ultrasound reveals a 6 cm anechoic collection with thick walls located in the lesser sac, posterior to

the stomach. The amylase levels are significantly elevated. What is the most likely finding?

A. Pancreatic pseudocyst
B. Splenic artery aneurysm
C. Peritoneal abscess
D. Pancreatic adenocarcinoma

Answer: A
Explanation: A pancreatic pseudocyst is a common sequela of acute pancreatitis, typically appearing as a well-defined, walled-off fluid collection in the lesser sac containing high levels of amylase.

Question: 1092

A sonographer is asked to assist in the operating room during a cryoablation of a hepatic tumor. The sonographer's primary role during the freezing cycle is to:

A. Monitor the "ice ball" formation and ensure it encompasses the tumor with a sufficient margin while avoiding adjacent structures
B. Perform the actual needle insertion for the surgeon
C. Adjust the anesthesia settings
D. Record the patient's vitals every five minutes

Answer: A
Explanation: During cryoablation, the ultrasound is used to monitor the growth of the "ice ball," which appears as a highly echogenic interface with dense posterior shadowing. The sonographer must ensure the surgeon can see that the entire tumor is covered by the lethal cold zone while protecting nearby organs like the diaphragm or gallbladder.

Question: 1093

A 40-year-old female presents with persistent RUQ pain after meals. The gallbladder is distended, but no stones or wall thickening are seen. A fatty meal challenge is performed, and the gallbladder volume decreases by only 15% after 45 minutes. What does this finding suggest?

A. Adenomyomatosis
B. Biliary dyskinesia
C. Normal gallbladder function
D. Cholelithiasis

Answer: B
Explanation: Biliary dyskinesia is a functional disorder where the gallbladder does not contract effectively.

A normal gallbladder ejection fraction is typically considered to be greater than 35%; a decrease of only 15% indicates impaired emptying and functional obstruction.

Question: 1094

A 62-year-old male with a history of cirrhosis presents with increasing abdominal girth. During the ultrasound, the main portal vein is not visualized in the porta hepatis. Instead, multiple tortuous, worm-like venous structures are identified in the gallbladder wall and the hilum of the liver. Spectral Doppler of these vessels shows hepatopetal, low-velocity continuous flow. These findings are most representative of:

A. Cavernous transformation of the portal vein
B. Portal vein aneurysm
C. Passive liver congestion
D. Hepatic artery enlargement

Answer: A
Explanation: Cavernous transformation occurs as a result of chronic portal vein thrombosis. When the main portal vein is occluded, the body develops numerous periportal collateral vessels to bypass the obstruction and maintain hepatopetal flow to the liver. These numerous small, tortuous vessels in the porta hepatis create a "cavernous" appearance on ultrasound.

Question: 1095

While scanning the RUQ, the sonographer notes that the gallbladder is not visualized in the gallbladder fossa. However, a gallbladder-like structure is identified inferior to the right lobe of the liver, almost in the right iliac fossa. What is the most likely diagnosis?

A. Phrygian cap
B. Ectopic gallbladder
C. Agenesis of the gallbladder
D. Gallbladder volvulus

Answer: B
Explanation: An ectopic gallbladder refers to a gallbladder that is located in an unusual position other than the gallbladder fossa, such as intrahepatic, left-sided, or in the lower abdominal/pelvic regions. This is a congenital variant.

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