



ARDMS AB-Abdomen Practice Questions

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Question 1

Question Type: MultipleChoice

Which foreign body is better visualized with sonography than computed tomography (CT)?

Options:

- A- Glass
- B- Wood
- C- Metal
- D- Stone

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Answer:

B

Explanation:

Wooden foreign bodies are often difficult to detect on CT because of their low radiodensity, but they are highly echogenic with posterior shadowing or reverberation on ultrasound, making ultrasound superior for detecting retained wooden objects. Glass, metal, and stones are better visualized with CT due to their high radiodensity.

According to AIUM and musculoskeletal ultrasound literature:

"Wood is poorly visualized on CT but demonstrates high reflectivity and acoustic shadowing on ultrasound."

Bianchi S, Martinoli C. Ultrasound of the Musculoskeletal System. Springer, 2007.

AIUM Practice Parameter for Musculoskeletal Ultrasound, 2020.

Question 2

Question Type: MultipleChoice

Which of the following must be sterile for a percutaneous procedure?

Options:

- A- Transducer
- B- Machine controls
- C- Transducer cover
- D- Gel within transducer cover

Answer:

D

Explanation:

In percutaneous procedures such as biopsies or drainages, maintaining a sterile field is critical to avoid introducing infection. While the transducer is covered by a sterile cover, the gel placed inside this cover (between the probe and the cover) must also be sterile, as it contacts the sterile field. The transducer itself and machine controls are not sterile but are handled appropriately to avoid field contamination.

According to the AIUM Guidelines:

'Sterile coupling gel must be used inside the sterile probe cover during all invasive or percutaneous procedures.' (AIUM Guidelines for Cleaning and Preparing Ultrasound Transducers, 2021).

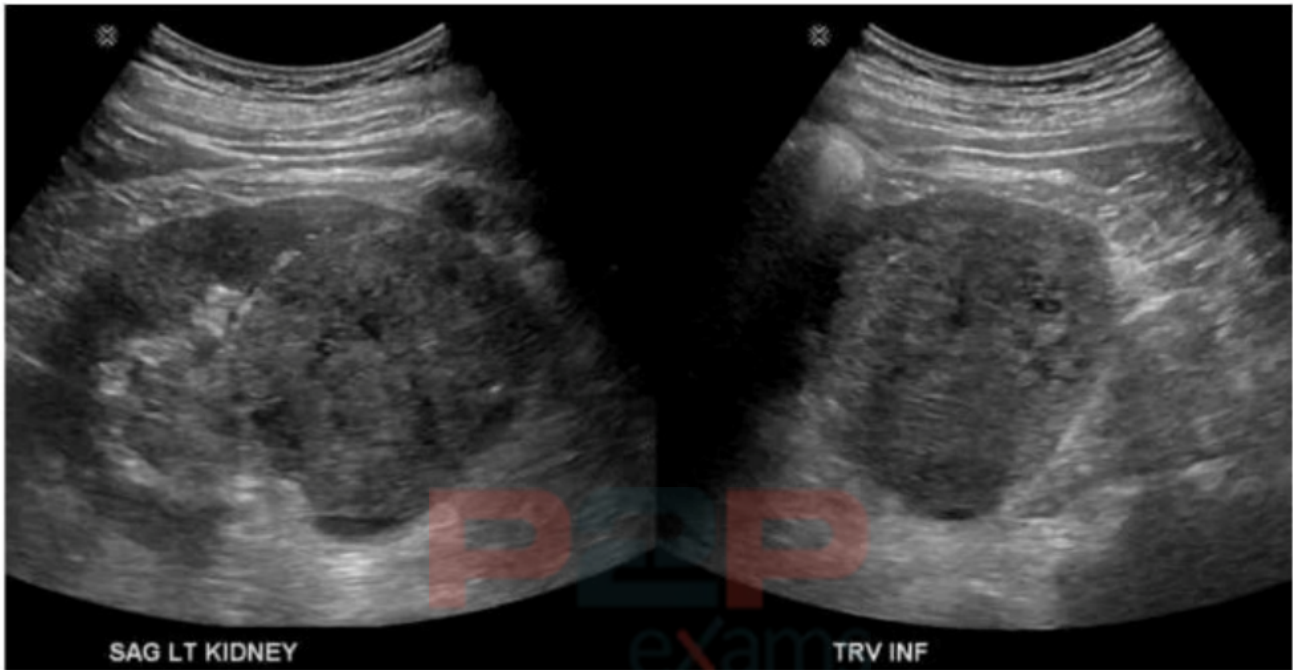
AIUM Guidelines for Cleaning and Preparing Ultrasound Transducers and Equipment for Reuse, 2021.

ACR Practice Parameter for Performing Ultrasound-Guided Procedures, 2020.

Question 3

Question Type: MultipleChoice

Which diagnosis is most accurate based on the findings in this image from an adult patient?



Options:

- A- Nephroblastoma
- B- Clear cell carcinoma
- C- Renal cell carcinoma
- D- Transitional cell carcinoma

Answer:

C

Explanation:

The ultrasound images (sagittal and transverse views of the left kidney) demonstrate a large, well-defined, heterogeneous mass within the renal parenchyma. This is highly characteristic of renal cell carcinoma (RCC), the most common primary renal malignancy in adults.

Renal cell carcinoma accounts for approximately 85% of all malignant renal tumors in adults. RCC often appears as:

A solid, heterogeneous, hypoechoic to isoechoic mass within the kidney

May contain areas of necrosis or hemorrhage (seen as mixed echogenicity)

Distortion of the normal renal contour

May have internal vascularity on Doppler imaging

Clear cell carcinoma (choice B) is the most common histological subtype of RCC but is not a separate diagnosis from RCC in imaging terms. Therefore, the most accurate answer is choice

C: Renal cell carcinoma.

Differentiation from other options:

A . Nephroblastoma (Wilms tumor): A pediatric renal tumor, typically seen in children under 5 years of age---not applicable in adults.

B . Clear cell carcinoma: Histological subtype of RCC, not a distinct radiologic diagnosis.

D . Transitional cell carcinoma: Arises from the renal pelvis or ureter, typically appears as a central or collecting system mass rather than a cortical/parenchymal one.

Rumack CM, Wilson SR, Charboneau JW, Levine D. Diagnostic Ultrasound. 5th Edition. Elsevier, 2018. Chapter: Kidneys, pp. 215--222.

Radiopaedia.org. Renal cell carcinoma: <https://radiopaedia.org/articles/renal-cell-carcinoma>

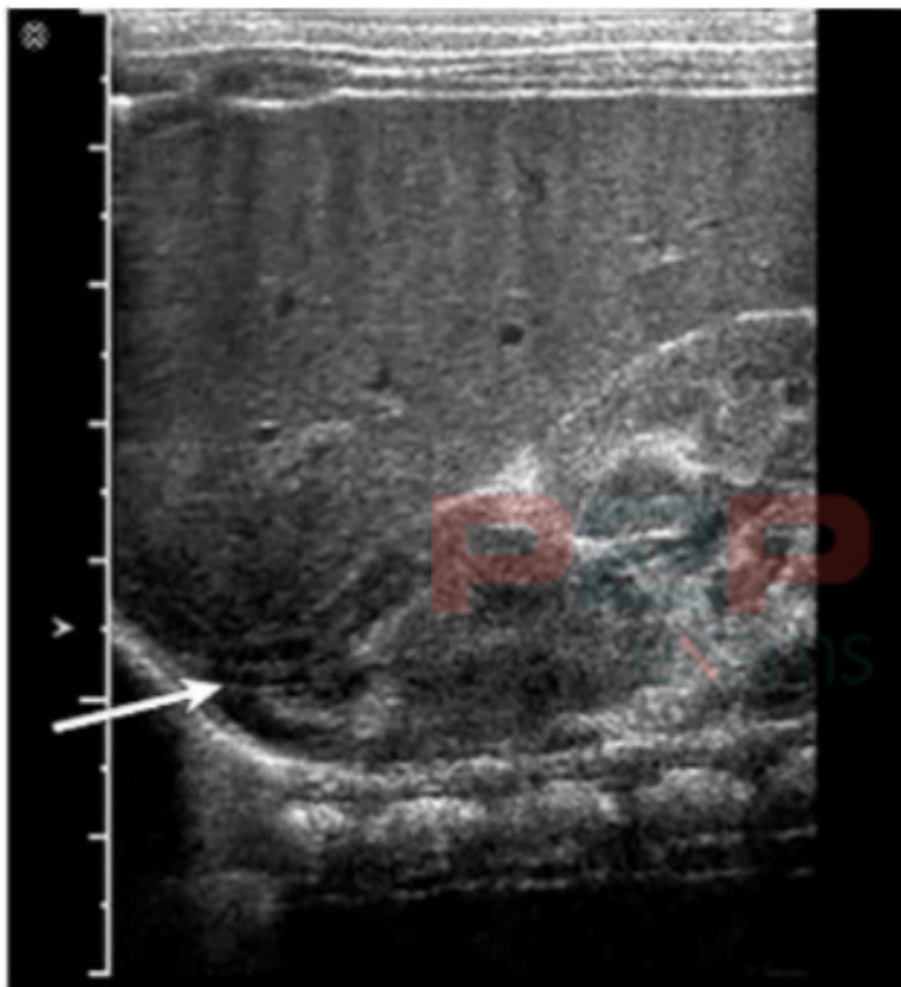
American College of Radiology (ACR) Appropriateness Criteria -- Hematuria, 2022.

Question 4

Question Type: MultipleChoice

Which structure is indicated by the arrow in this image?

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Options:

- A- Kidney
- B- Bowel loop
- C- Diaphragm
- D- Adrenal gland

Answer:

D

Explanation:

The structure indicated by the arrow in the ultrasound image is the adrenal gland. On ultrasound, the adrenal gland in neonates and infants is relatively large and has a distinctive "Y" or "V" shape in the transverse view. It is located superior and slightly medial to the upper pole of the kidney.

In this image, the arrow is pointing to a hypoechoic, curved structure with a thin echogenic central stripe, representing the fetal adrenal gland. This echogenic stripe corresponds to the adrenal medulla, while the surrounding hypoechoic area represents the cortex.

Differential features:

Kidney: While the kidney is visualized posterior to the adrenal gland and shows a reniform shape with a central echogenic sinus and peripheral cortex, it is not the structure being directly pointed to by the arrow.

Bowel loop: Bowel has variable echogenicity with peristalsis and shadowing from air. It does not have the consistent morphology or location seen in the image.

Diaphragm: Appears as a thin, hyperechoic linear structure separating the thoracic cavity from the abdomen. It is seen more superiorly than the indicated structure and lacks the "Y" or "V" adrenal configuration.

Key Anatomical Landmarks:

The adrenal glands are located in the retroperitoneum, superior to the kidneys, and appear prominent on ultrasound in neonates.

In transverse view, the right adrenal gland is anterior to the crus of the diaphragm and posterior to the inferior vena cava (IVC).

Rumack CM, Wilson SR, Charboneau JW, Levine D. Diagnostic Ultrasound. 5th Edition. Elsevier, 2018. Chapter: Adrenal Glands and Retroperitoneum, pp. 291--295.

American Institute of Ultrasound in Medicine (AIUM) Practice Parameter for the Performance of an Ultrasound Examination of the Abdomen and/or Retroperitoneum. 2020.

Question 5

Question Type: MultipleChoice

Which technique best differentiates a bladder mass from a hematoma?

Options:

- A- Use harmonic imaging
- B- Obtain post-void image
- C- Fill the bladder
- D- Change patient position

Answer:

D

Explanation:

Changing the patient's position allows evaluation of lesion mobility. Blood clots and hematomas are often mobile, while true bladder wall masses remain fixed. This technique helps differentiate between solid masses and non-adherent debris.

According to Rumack's Diagnostic Ultrasound:

"Changing patient position may distinguish between mobile blood clots and fixed bladder wall masses."

Rumack CM, Wilson SR, Charboneau JW, Levine D. Diagnostic Ultrasound. 5th ed. Elsevier, 2017.

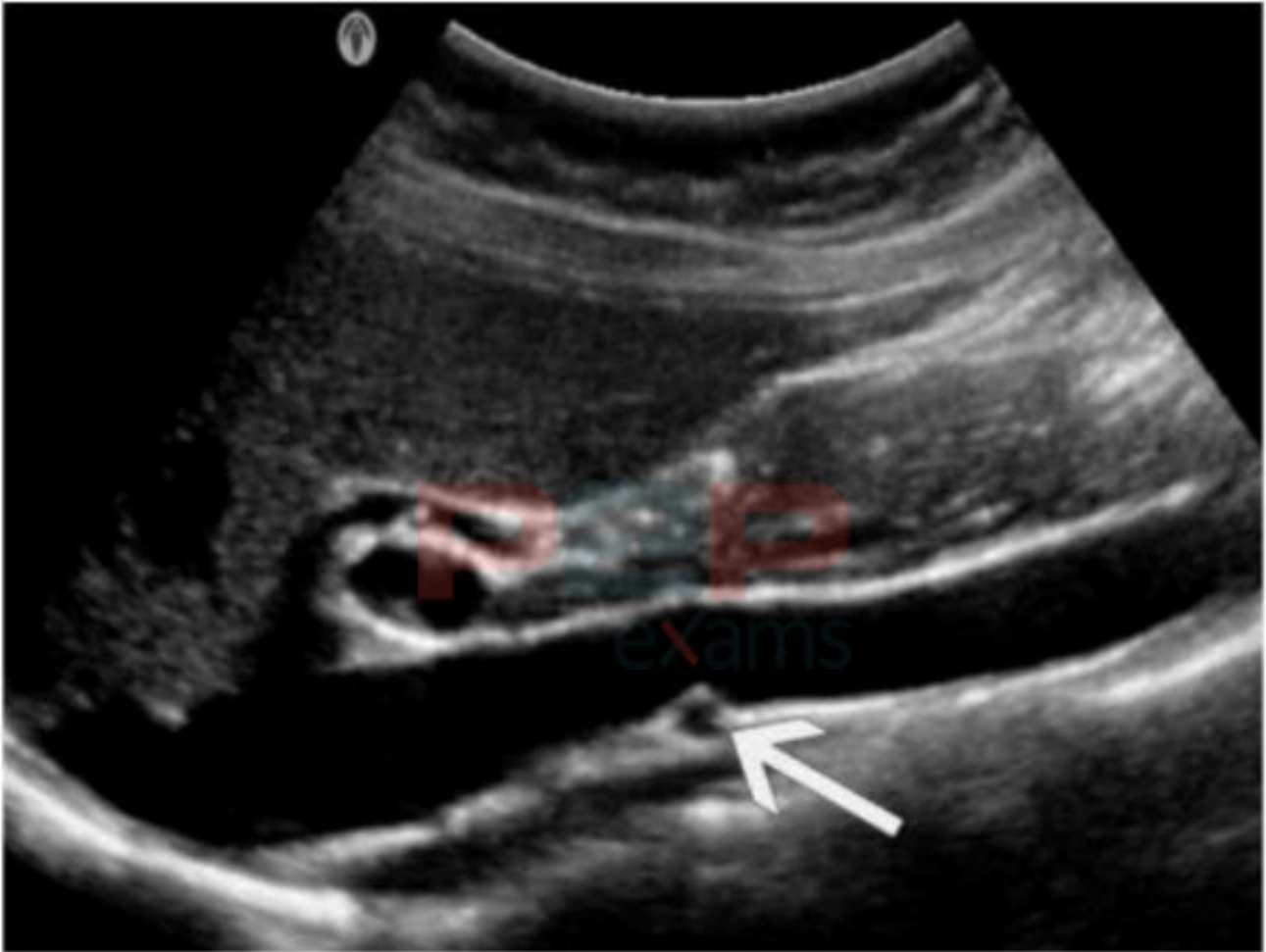
AIUM Practice Parameter for Bladder Ultrasound, 2020.

Question 6

Question Type: MultipleChoice

Which vessel is indicated by the arrow on this image?

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Options:

- A- Proper hepatic artery
- B- Superior mesenteric artery
- C- Left renal vein
- D- Right renal artery

Answer:

B

Explanation:

The ultrasound image demonstrates a transverse view of the abdominal vasculature, where the arrow is pointing to a circular vascular structure anterior to the aorta and posterior to the body of the pancreas --- consistent with the superior mesenteric artery (SMA).

The SMA originates from the anterior aspect of the abdominal aorta just below the level of the celiac trunk and courses anterior to the left renal vein and uncinate process of the pancreas. On transverse ultrasound, it is often seen in cross-section as a round, pulsatile structure with echogenic walls, situated just anterior to the aorta. This appearance is known as the "target

sign" or "bull's-eye" appearance.

Vessel Position Landmarks (transverse plane):

Aorta: Posterior and central

SMA: Just anterior to the aorta

Left renal vein: Passes between the aorta and SMA (nutcracker location)

Right renal artery: Courses posterior to the IVC toward the right kidney

Differentiation from other options:

A . Proper hepatic artery: Typically visualized within the liver hilum (portal triad), not in this anatomic location.

C . Left renal vein: Seen in transverse as a longer, oval structure crossing anterior to the aorta and posterior to the SMA.

D . Right renal artery: Arises laterally from the aorta and courses posterior to the IVC --- not visualized in this axial midline location.

Rumack CM, Wilson SR, Charboneau JW, Levine D. Diagnostic Ultrasound. 5th Edition. Elsevier, 2018. Chapter: Vascular Anatomy and Abdominal Vessels, pp. 471--475.

American Institute of Ultrasound in Medicine (AIUM) Practice Parameter for the Performance of an Ultrasound Examination of the Abdomen and/or Retroperitoneum, 2020.

Radiopaedia.org. Superior mesenteric artery:

<https://radiopaedia.org/articles/superior-mesenteric-artery>

Question 7

Question Type: MultipleChoice

Which renal condition is commonly associated with pyuria and leukocytosis?

Options:

- A- Nephrocalcinosis
- B- Staghorn calculus
- C- Renal cell carcinoma
- D- Acute pyelonephritis

Answer:

D

Explanation:

Acute pyelonephritis is a bacterial infection of the renal parenchyma and collecting system. Classic clinical findings include fever, flank pain, leukocytosis (elevated white blood cells), and pyuria (white blood cells in urine). Ultrasound may demonstrate renal enlargement, decreased echogenicity, and loss of corticomedullary differentiation.

Nephrocalcinosis (A) involves calcium deposition without infection.

Staghorn calculus (B) may lead to infection but is primarily characterized by obstructive uropathy.

Renal cell carcinoma (C) presents with hematuria and mass formation rather than infection symptoms.

Reference Extracts:

Rumack CM, Wilson SR, Charboneau JW, Levine D. Diagnostic Ultrasound. 5th ed. Elsevier, 2017. Chapter: Kidneys.

Middleton WD, Kurtz AB, Hertzberg BS. Ultrasound: The Requisites. 3rd ed. Elsevier, 2015.

Question 8

Question Type: MultipleChoice

Which condition is most likely the cause of claudication experienced two weeks after this image was obtained?



Options:

- A- Neuropathy
- B- Infected hematoma
- C- Thrombophlebitis
- D- Ruptured Baker cyst

Answer:

D

Explanation:

The ultrasound image demonstrates a fluid-filled structure in the posterior knee region, consistent with a Baker cyst (also called a popliteal cyst). A Baker cyst is a synovial fluid-filled sac arising from the posterior medial aspect of the knee joint, typically extending between the medial head of the gastrocnemius and the semimembranosus tendon.

The history of delayed-onset claudication (pain in the calf when walking) two weeks after this image was obtained is strongly suggestive of a ruptured Baker cyst. When a Baker cyst ruptures, synovial fluid may track inferiorly into the calf, producing pain, swelling, and clinical symptoms that mimic deep vein thrombosis (DVT) or arterial insufficiency (e.g., pseudothrombophlebitis syndrome).

Ultrasound findings consistent with a ruptured Baker cyst:

Complex fluid collection tracking along muscle fascial planes (hypoechoic to anechoic)

Posterior calf swelling and tenderness

Absence of thrombus in the deep venous system

Crescent-shaped fluid may be seen between muscle compartments

Why the other choices are incorrect:

A . Neuropathy: Would not show fluid-filled structures on ultrasound and would not present with calf swelling.

B . Infected hematoma: May appear complex, but would require a history of trauma or anticoagulation and systemic signs (fever, redness).

C . Thrombophlebitis: Involves a thrombosed superficial vein with wall thickening and surrounding inflammation, which is not seen in this image.

American Institute of Ultrasound in Medicine (AIUM). Practice Guidelines for Musculoskeletal Ultrasound Examination, 2020.

Bianchi S., Martinoli C. Ultrasound of the Musculoskeletal System. Springer, 2007. Chapter: Knee Region --- Popliteal Fossa and Baker's Cyst, pp. 433-437.

Radiopaedia.org. Ruptured Baker cyst: <https://radiopaedia.org/articles/ruptured-bakers-cyst>

Question 9

Question Type: MultipleChoice

What is the main purpose for performing focused abdominal sonography for trauma (FAST) exams?

Options:

- A- Detection of free peritoneal fluid
- B- Diagnosis of organ laceration
- C- Detection of peritoneal air
- D- Confirmation of peritoneal lavage findings

Answer:

A

Explanation:

The FAST exam is primarily used to detect free intraperitoneal or pericardial fluid in trauma patients, serving as a rapid, bedside assessment tool. While organ injuries may be suspected, the FAST exam is not primarily designed to assess for solid organ lacerations.

According to AIUM and ACEP guidelines:

"The primary goal of the FAST exam is to detect the presence of free fluid suggestive of hemorrhage in trauma patients."

American College of Emergency Physicians (ACEP) Ultrasound Guidelines, 2016.

AIUM Practice Parameter for the Performance of the FAST Examination, 2020.

Question 10

Question Type: MultipleChoice

Which sonographic finding distinguishes focal nodular hyperplasia from hepatic adenoma?

Options:

- A- Stellate area within the central portion of the mass
- B- Thin peripheral hypoechoic halo
- C- Central calcifications
- D- Target pattern

Answer:

A

Explanation:

The hallmark feature of focal nodular hyperplasia (FNH) is a central stellate scar seen on imaging. This fibrous scar may not always be seen on ultrasound but is a classic distinguishing feature from hepatic adenomas, which usually lack a central scar.

According to Rumack's Diagnostic Ultrasound:

"Focal nodular hyperplasia often demonstrates a central stellate scar, which may be echogenic or isoechoic."

Rumack CM, Wilson SR, Charboneau JW, Levine D. Diagnostic Ultrasound. 5th ed. Elsevier, 2017.

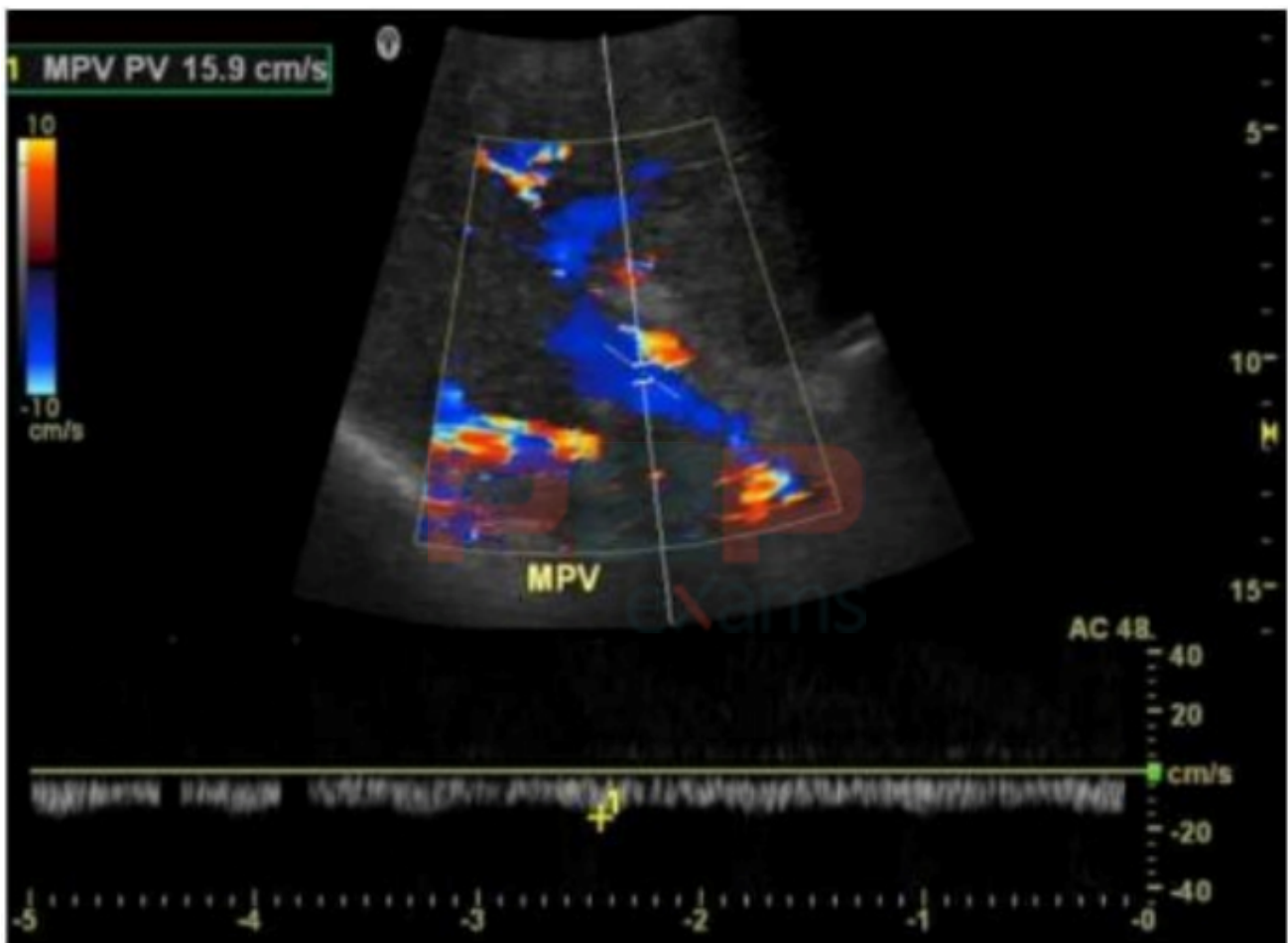
WHO Classification of Digestive System Tumors, 5th ed., IARC, 2019.

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Question 11

Question Type: MultipleChoice

Which condition is demonstrated in this image?



Options:

A- Cavernous transformation

B- Portal vein thrombosis

C- Portal hypertension

D- Tumor extension

D- Tumor extension: Typically appears as echogenic intraluminal material within the portal vein with arterial waveforms on Doppler due to neovascularity. Tumor thrombus can be seen in hepatocellular carcinoma or pancreatic cancer, not multiple small collateral vessels.

Answer:

A

Explanation:

The image shows a color Doppler ultrasound of the main portal vein (MPV), which appears irregular and replaced by multiple small, serpiginous vascular channels --- a hallmark of cavernous transformation. Cavernous transformation of the portal vein is a late complication of chronic portal vein thrombosis, in which collateral vessels develop around the thrombosed portal vein to bypass the obstruction.

Key Doppler ultrasound features of cavernous transformation:

Absence of a normal portal vein

Multiple tortuous vessels in the porta hepatis

Color Doppler shows hepatopetal flow in these channels

Low velocity, continuous waveform flow in collateral vessels

Differentiation from other options:

B . Portal vein thrombosis: Would show an absence of color flow within the portal vein lumen and possibly echogenic material within the vessel. There would be no serpiginous collateral vessels yet if it's an acute process.

C . Portal hypertension: Often diagnosed with other sonographic findings (e.g., splenomegaly, reversed portal flow, varices) but not characterized by the replacement of the portal vein by collateral vessels.

Rumack CM, Wilson SR, Charboneau JW, Levine D. Diagnostic Ultrasound. 5th Edition. Elsevier, 2018. Chapter: Portal Venous System, pp. 107--110.

American Institute of Ultrasound in Medicine (AIUM). Practice Parameter for the Performance of a Vascular Ultrasound Examination, 2021.

Radiopaedia.org. Cavernous transformation of the portal vein:

<https://radiopaedia.org/articles/cavernous-transformation-of-the-portal-vein>

Question 12

Question Type: MultipleChoice

Which sonographic finding indicates the need for immediate surgical intervention following testicular trauma?

Options:

- A- Intratesticular hematoma
- B- Discontinuity of the tunica albuginea
- C- Heterogeneity of the testicular parenchyma
- D- Increased testicular vascularity

Answer:

B

Explanation:

The tunica albuginea is a dense fibrous capsule surrounding the testis. Discontinuity of the tunica albuginea on ultrasound is diagnostic of testicular rupture --- a urologic emergency that requires immediate surgical repair to preserve testicular function and viability. Early surgical intervention within 72 hours has a high success rate for testicular salvage (up to 90%).

Intratesticular hematoma (A) may be managed conservatively if the tunica albuginea is intact.

Heterogeneity of the parenchyma (C) indicates injury but not necessarily rupture.

Increased vascularity (D) may be seen with inflammation or reperfusion but does not mandate surgery unless rupture is present.

Reference Extracts:

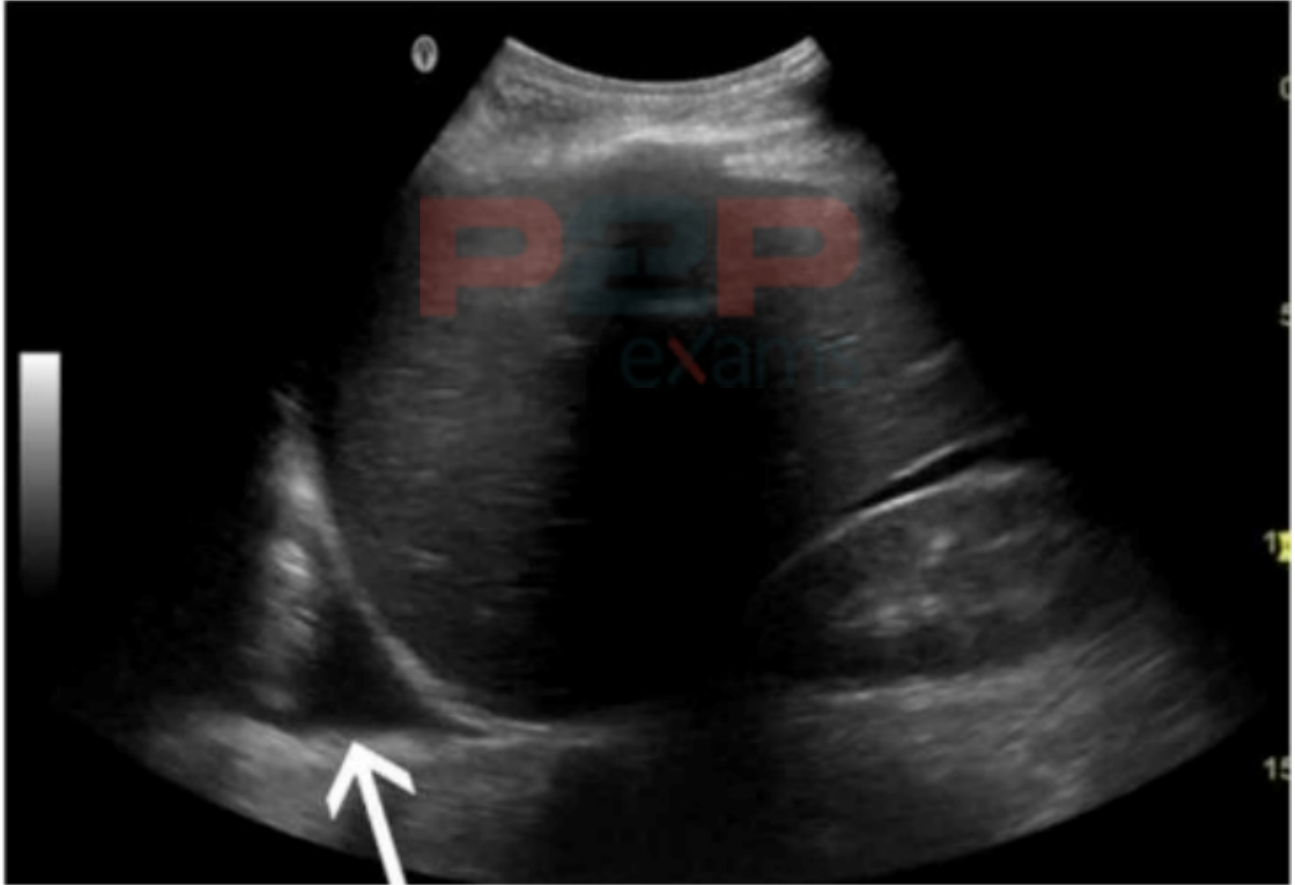
Dogra VS, Bhatt S. 'Acute painful scrotum: ultrasound evaluation.' Radiologic Clinics of North America. 2004; 42(2):349-363.

Middleton WD, Kurtz AB, Hertzberg BS. Ultrasound: The Requisites. 3rd ed. Elsevier, 2015.

Question 13

Question Type: MultipleChoice

Which finding is indicated by the arrow in this image of the right upper quadrant?



Options:

- A- Retroperitoneal hemorrhage
- B- Pleural effusion
- C- Mirror image
- D- Ascites

Answer:

B

Explanation:

The image provided is a right upper quadrant (RUQ) ultrasound---typically performed during a FAST (Focused Assessment with Sonography in Trauma) exam or for abdominal assessment. The arrow points to an anechoic (black) fluid collection seen above the diaphragm and posterior

to the liver.

This fluid collection lies within the thoracic cavity, confirming the diagnosis of a pleural effusion. Pleural effusions are seen sonographically as an anechoic or hypoechoic area superior to the diaphragm in the thoracic cavity and often appear triangular or crescent-shaped. The diaphragm is visualized as a curvilinear echogenic structure separating the liver (or spleen) below from the lung space above.

Comparison of answer choices:

- A . Retroperitoneal hemorrhage would be seen in the posterior abdomen, not above the diaphragm.
- B . Pleural effusion is correct---anechoic fluid above the diaphragm is classic for this condition.
- C . Mirror image artifact occurs when liver echoes are mirrored across the diaphragm and lung--this is not a mirror artifact.
- D . Ascites collects inferior to the diaphragm and around the abdominal organs, not in the thoracic cavity.

Ma OJ, Mateer JR, Blaivas M. Emergency Ultrasound, 3rd ed. McGraw-Hill; 2014.

Moore CL, Copel JA. Point-of-care ultrasonography. N Engl J Med. 2011;364(8):749--757.

Rumack CM, Wilson SR, Charboneau JW, Levine D. Diagnostic Ultrasound, 5th ed. Elsevier; 2017.

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