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KOREAN SOCIETY OF ULTRASOUND IN MEDICINE

KSUM

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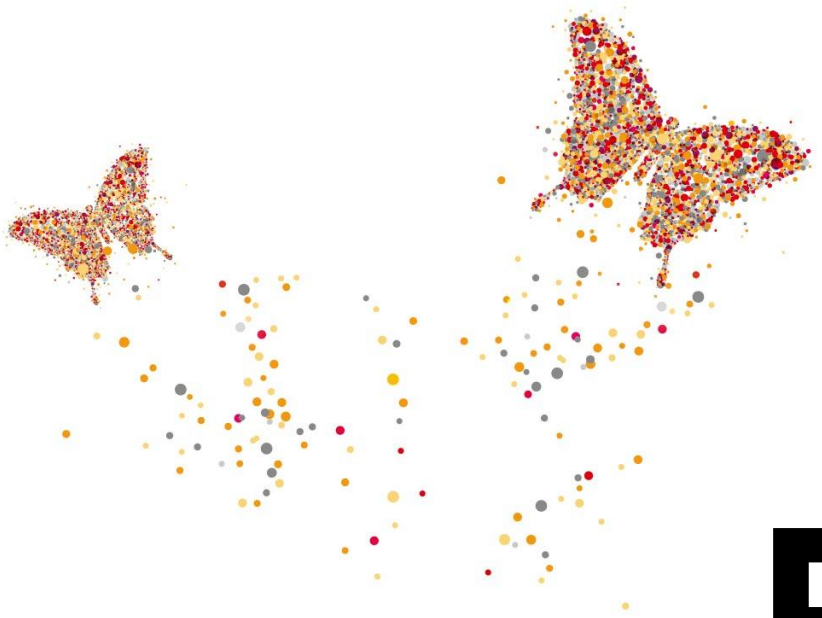
KSUM 2026

THE 57TH ANNUAL CONGRESS OF THE KOREAN SOCIETY OF ULTRASOUND IN MEDICINE

MAY 7 (THU) - **8** (FRI), **2026** I COEX, SEOUL, **KOREA**

KSUM Quiz Challenge



KSUM 2026

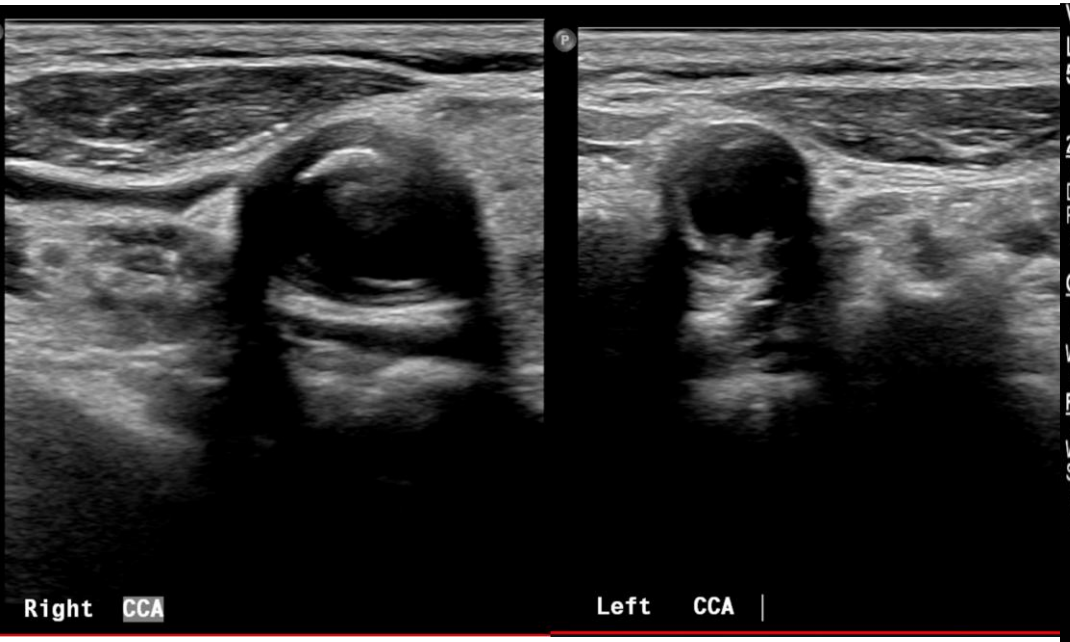
THE 57TH ANNUAL CONGRESS OF
THE KOREAN SOCIETY OF ULTRASOUND IN MEDICINE

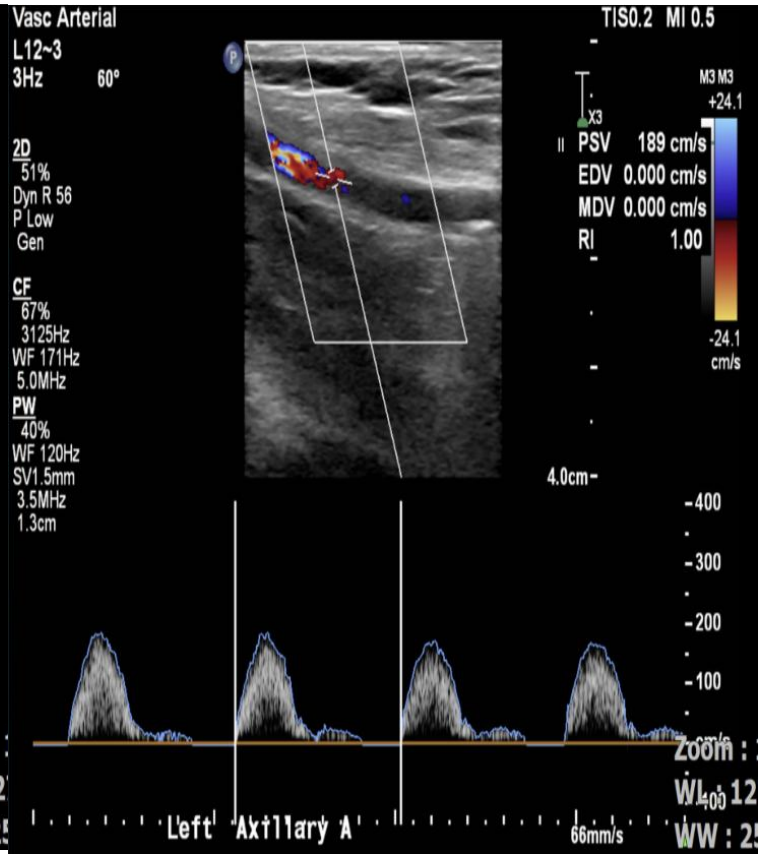
Round 1

Question 1

Question 1 (Cardiovascular, Difficulty: Low)

Q. A 69-year-old woman presented with a difference in blood pressure between her arms. What is the most likely diagnosis?



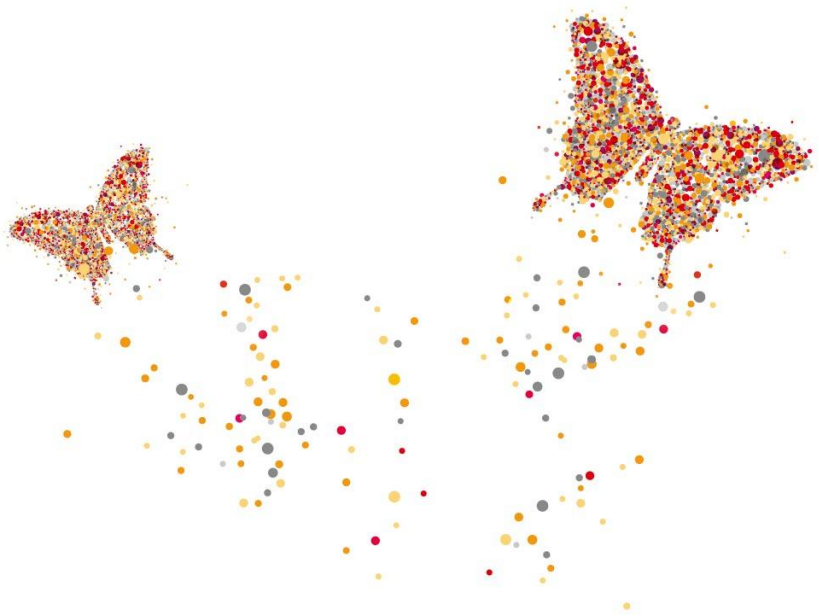


① Atherosclerotic subclavian artery stenosis

② Takayasu's arteritis

③ Thoracic outlet syndrome

④ Thromboangiitis obliterans



What is the Correct Answer?

① Atherosclerotic subclavian artery stenosis

② Takayasu's arteritis

③ Thoracic outlet syndrome

④ Thromboangiitis obliterans

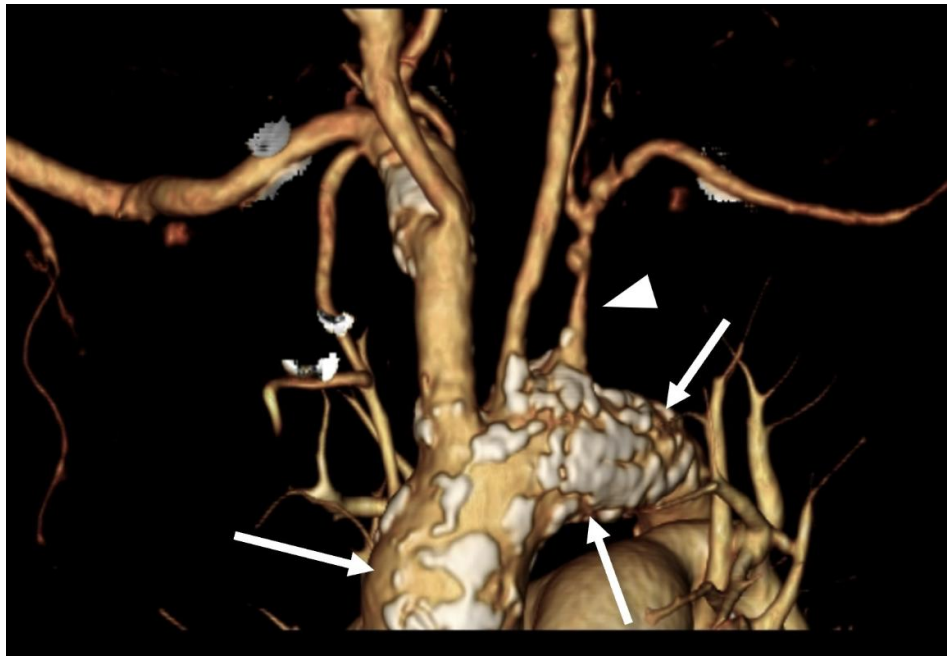
② Takayasu's arteritis

- **Key symptom: Inter-arm blood pressure difference** → suggests proximal large-artery stenosis
- **Limitation in US:** subclavian arteries cannot be fully evaluated due to clavicular shadowing

- **Doppler US:**
  - Left arm (axillary): monophasic waveform + reduced PSV
  - Right arm: normal triphasic waveform
  → **Severe proximal inflow stenosis, most consistent with left subclavian artery stenosis**

- **Carotid grey-scale US:** perivascular soft-tissue thickening + calcification along both common carotid arteries
  - **suggests systemic large-vessel vasculitis with chronic change**

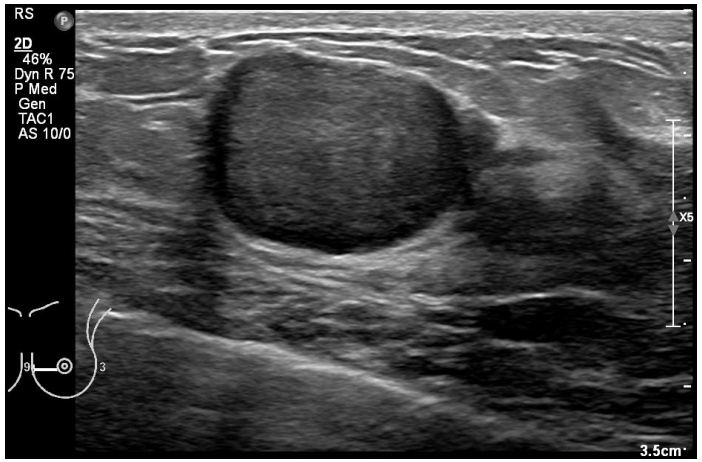
- **CT findings:** diffuse aortic calcification + severe left subclavian artery stenosis

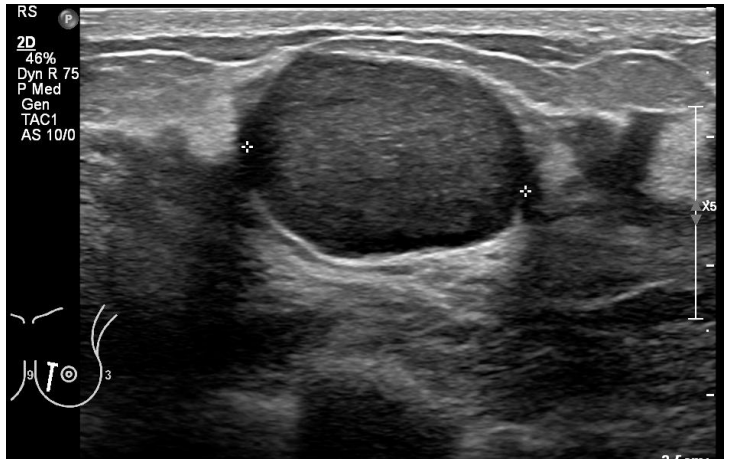


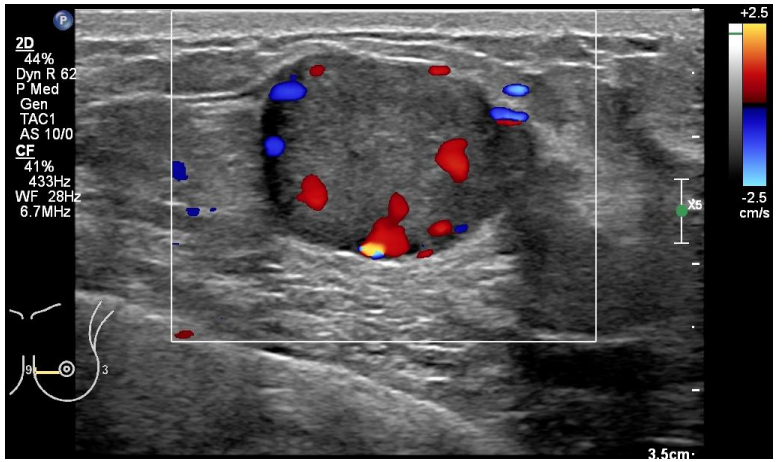
Question 2

Question 2 (Breast, Difficulty: Low)

Q. A 33-year-old woman presented with left palpable breast mass. What is your diagnosis?





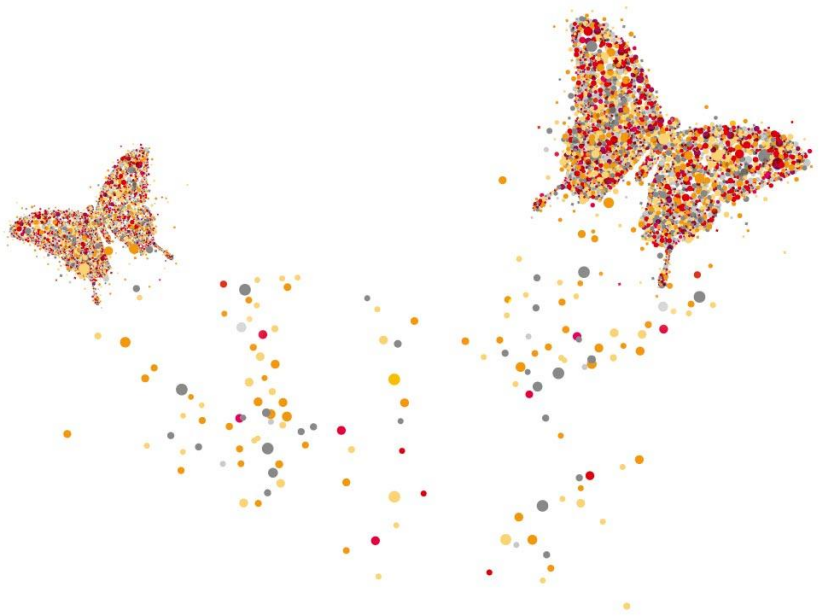


① Fibroadenoma

② Pseudoangiomatous Stromal Hyperplasia

③ Phyllodes tumor

④ Invasive ductal carcinoma



What is the Correct Answer?

① Fibroadenoma

② Pseudoangiomatous Stromal Hyperplasia

③ Phyllodes tumor

④ Invasive ductal carcinoma

③ Phyllodes tumor

- **Presentation**

  Middle-aged woman; firm, mobile, palpable lump

- **Demographics**

  Older age group than FA; median 45-49

  Range: 10-80 years; rarely <30 or >60

  Phyllodes tumor classified into benign (low grade), borderline, and malignant (high grade) based on combined histologic features

  Stromal cellularity and atypia, mitotic count

- **Mammographic findings**

  Dense oval mass with circumscribed or obscured margins

- **US findings**

  Oval (or lobulated) hypoechoic mass with circumscribed margins

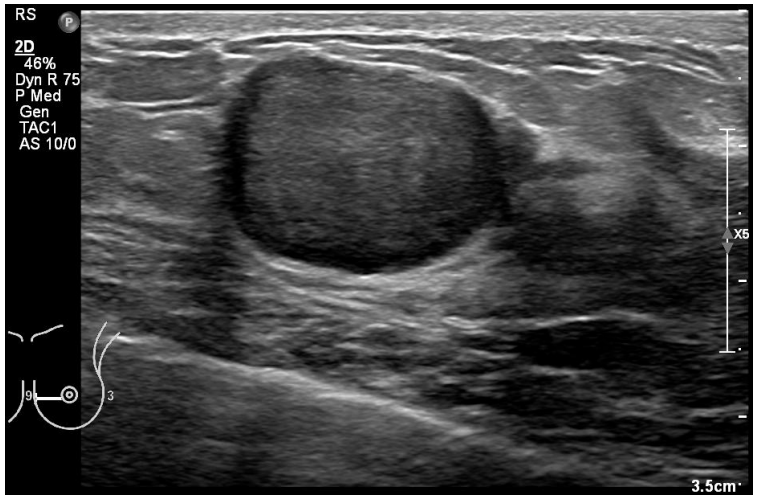
  - Indistinct or angular margins: ↑ likelihood of borderline or malignant PT

  May have cystic spaces or internal clefts

  - Cystic component ↑ : ↑ likelihood of borderline or malignant PT

  Color or power Doppler

  - Vascularity common, but not always present



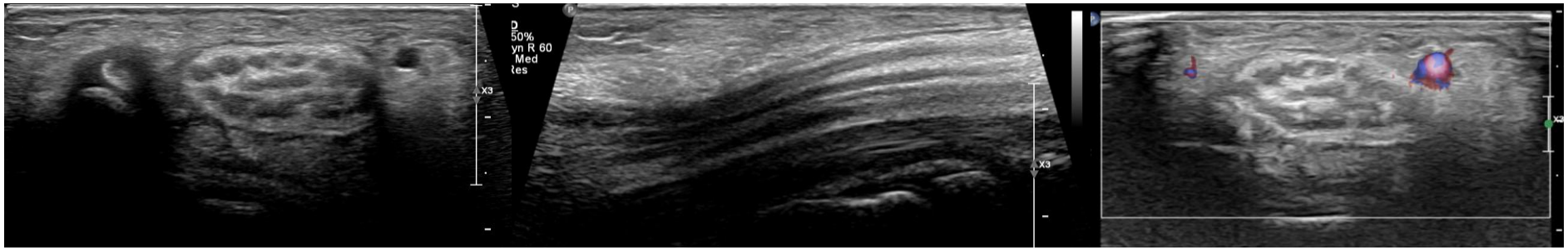
References (Diagnostic Imaging: Breast 3rd Edition; 654–659)

Question 3

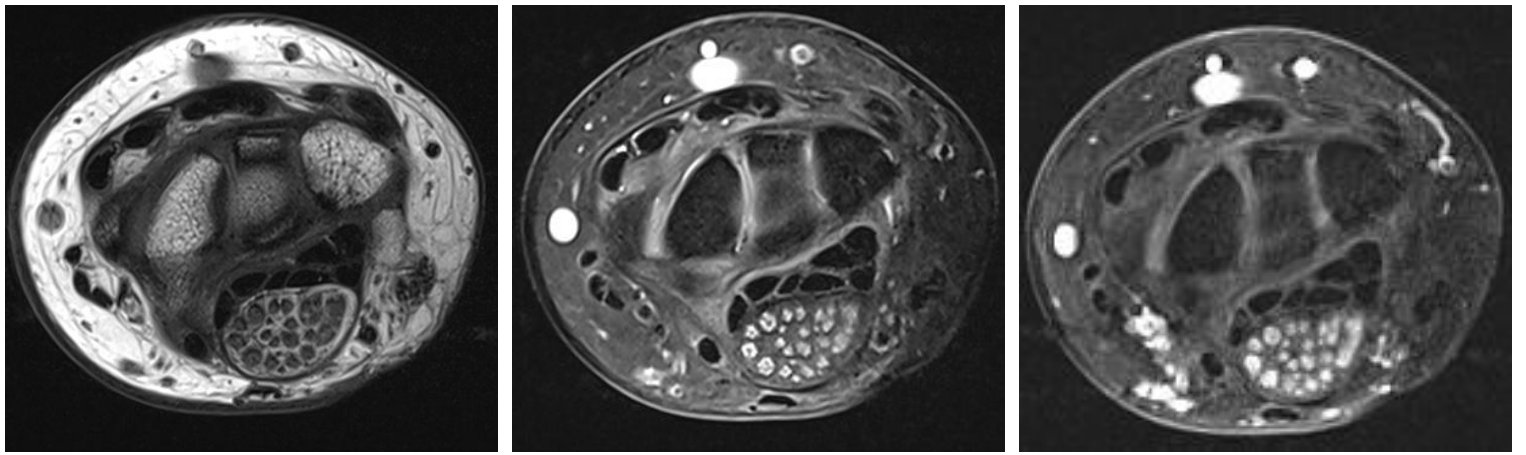
Question 3 (Musculoskeletal, Difficulty: Low)

Q. A 18-year-old female patient presented with tingling sensation of the palm. What is your diagnosis?

<US scan of the carpal tunnel>



Transverse scan | Longitudinal scan | Color Doppler US



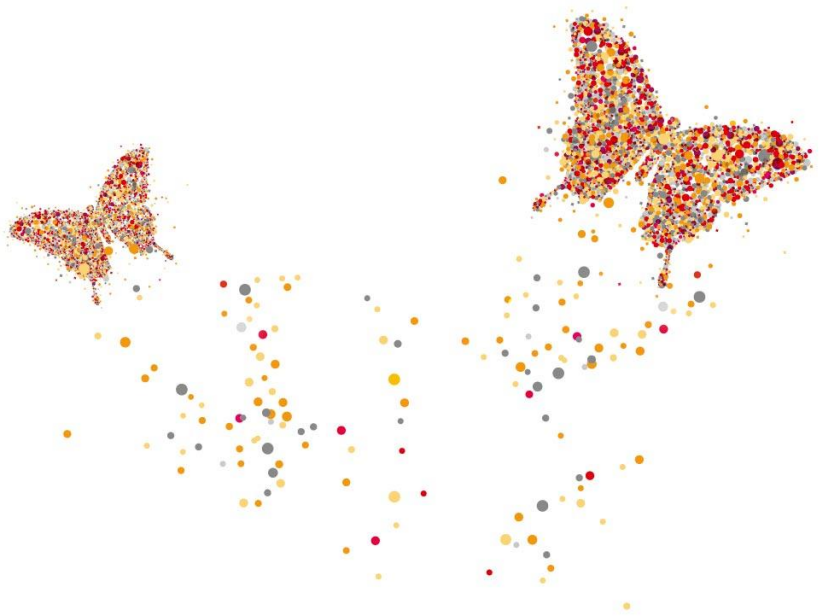
T1WI | FS T2WI | Enhanced FS T1WI

① Neuritis of the median nerve

② Neurogenic tumor of the median nerve

③ Fibrolipomatous hamartoma of the median nerve

④ Parsonage-Turner SD



What is the Correct Answer?

① Neuritis of the median nerve

② Neurogenic tumor of the median nerve

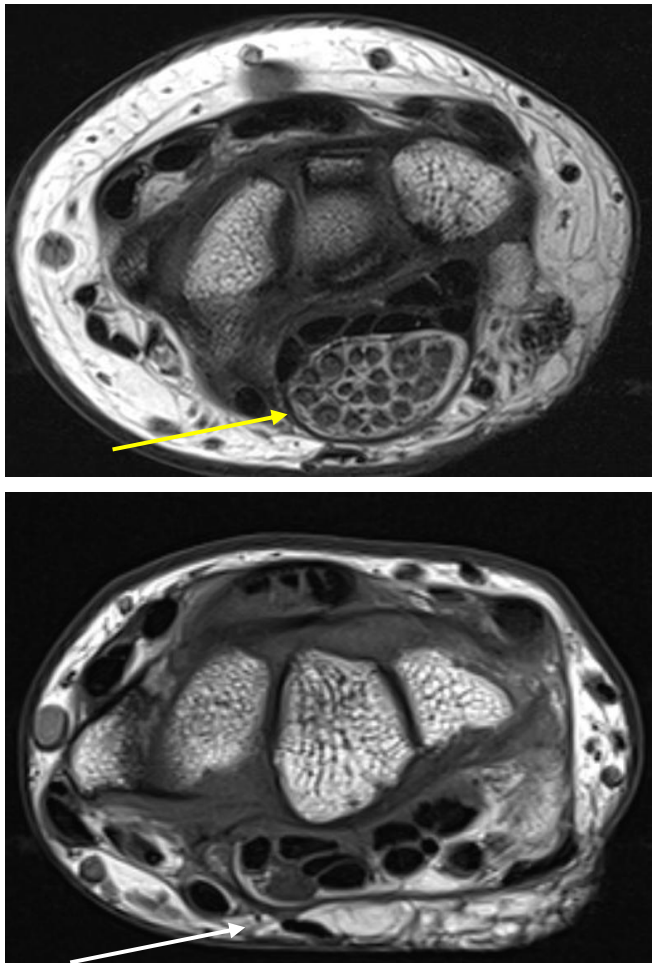
③ Fibrolipomatous hamartoma of the median nerve

④ Parsonage-Turner SD

③ Fibrolipomatous hamartoma of the nerve

- **Rare benign lesion** caused by **fibro-fatty proliferation within the nerve**, most commonly involving the **median nerve**.
- Results in **diffuse nerve enlargement with preserved but separated nerve fascicles**.
- Often located at the **carpal tunnel**.
- May be associated with **macrodactyly (macrodystrophia lipomatosa)**.

- Characteristic imaging appearance: **"coaxial cable" on transverse images and "spaghetti-like" on longitudinal images**.
- **Diagnosis is usually made by imaging**, and treatment is typically **conservative unless symptomatic compression occurs**.

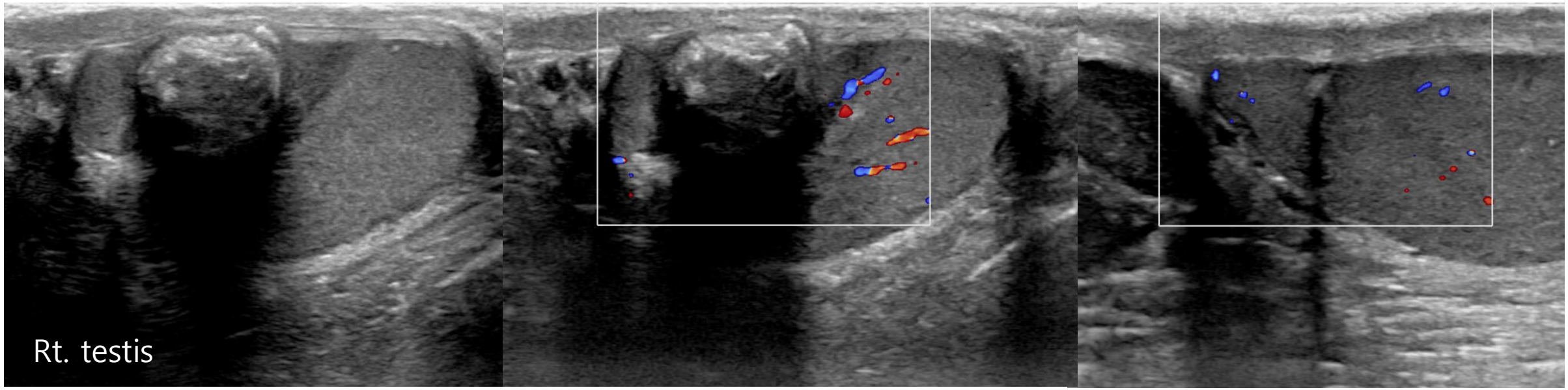


Normal median nerve for comparison

Question 4

Question 4 (Genitourinary, Difficulty: Low)

Q. A 24-year-old male with Rt. scrotal pain. What is the best diagnosis?

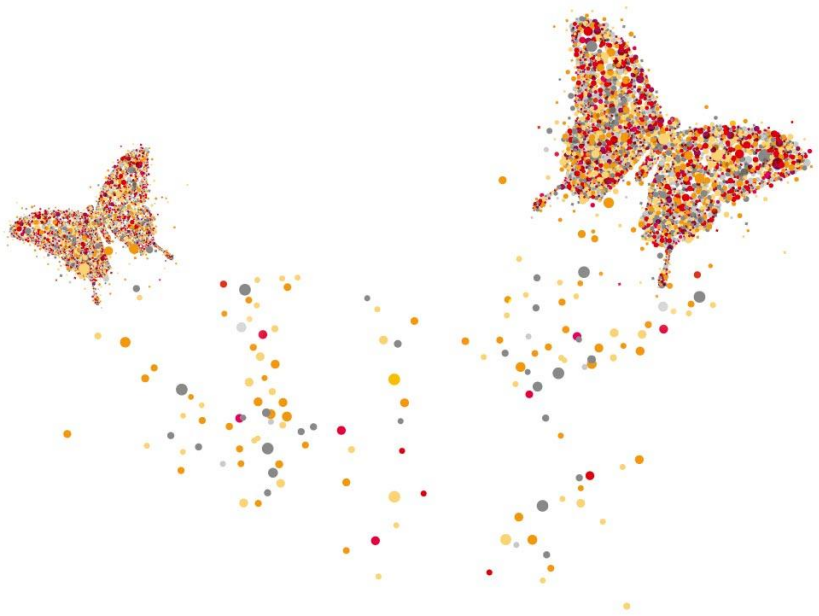


① Lymphoma

② Epidermoid cyst

③ Testicular abscess

④ Adenomatoid Tumor



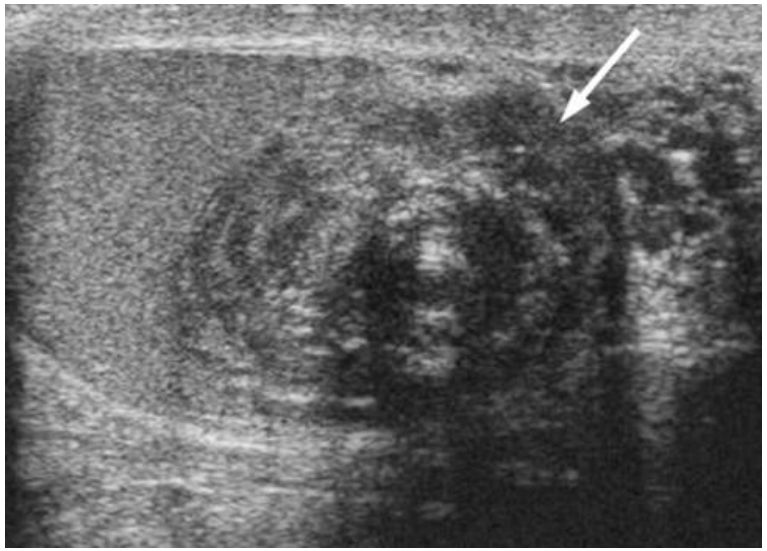
What is the Correct Answer?

① Lymphoma

② Epidermoid cyst

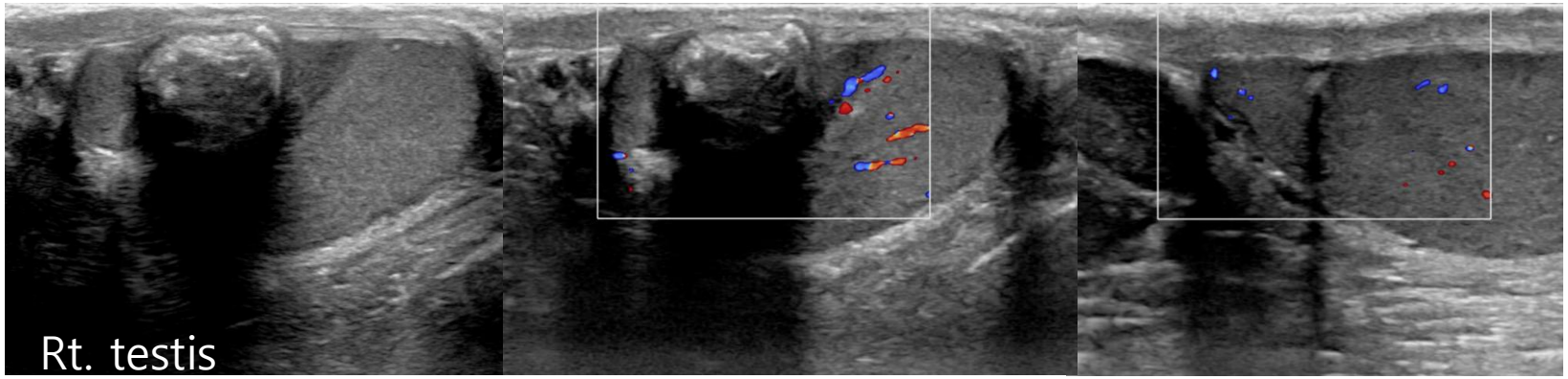
③ Testicular abscess

④ Adenomatoid Tumor



② Epidermoid cyst

- Classic appearance
  - onion-ring pattern with alternating hyperechoic and hypoechoic layers
- May present as a well-defined mass with a rim of calcification or
  a solid mass with an echogenic rim
- Internal vascularity is usually absent on color Doppler sonography

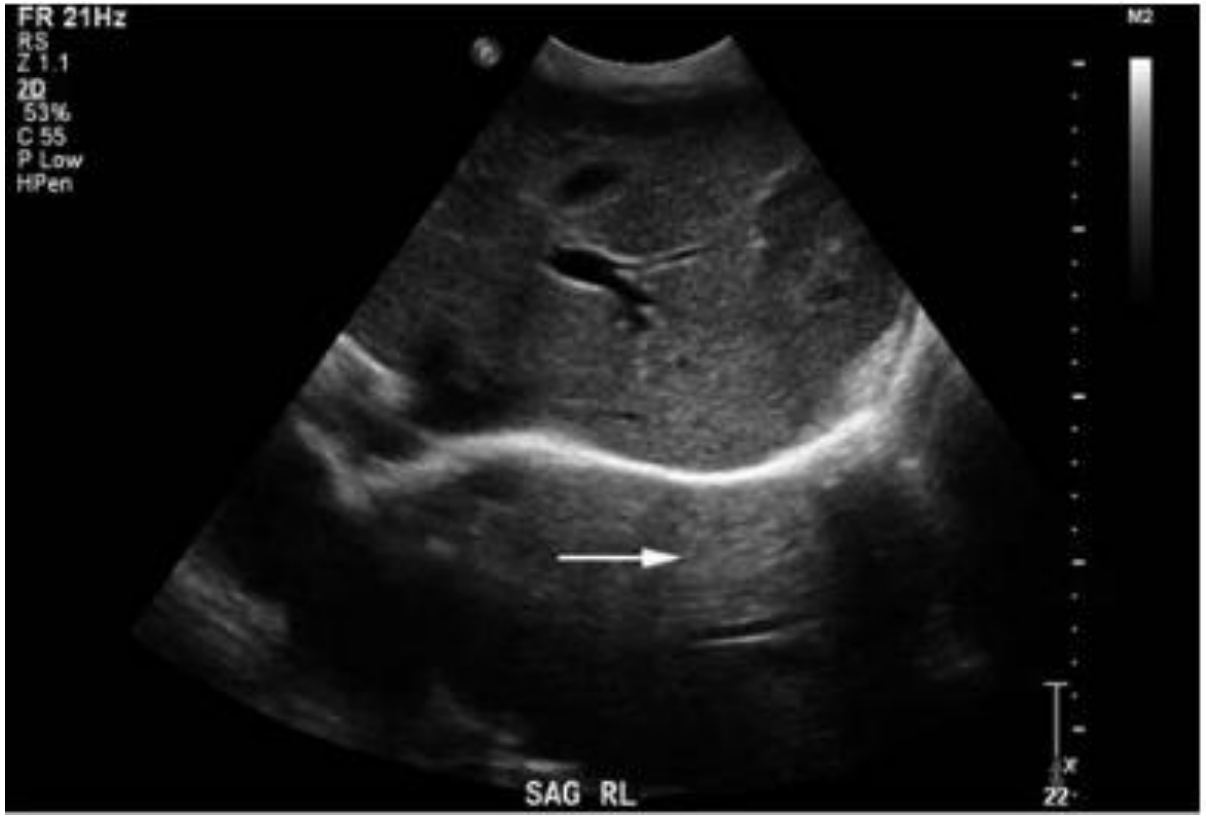


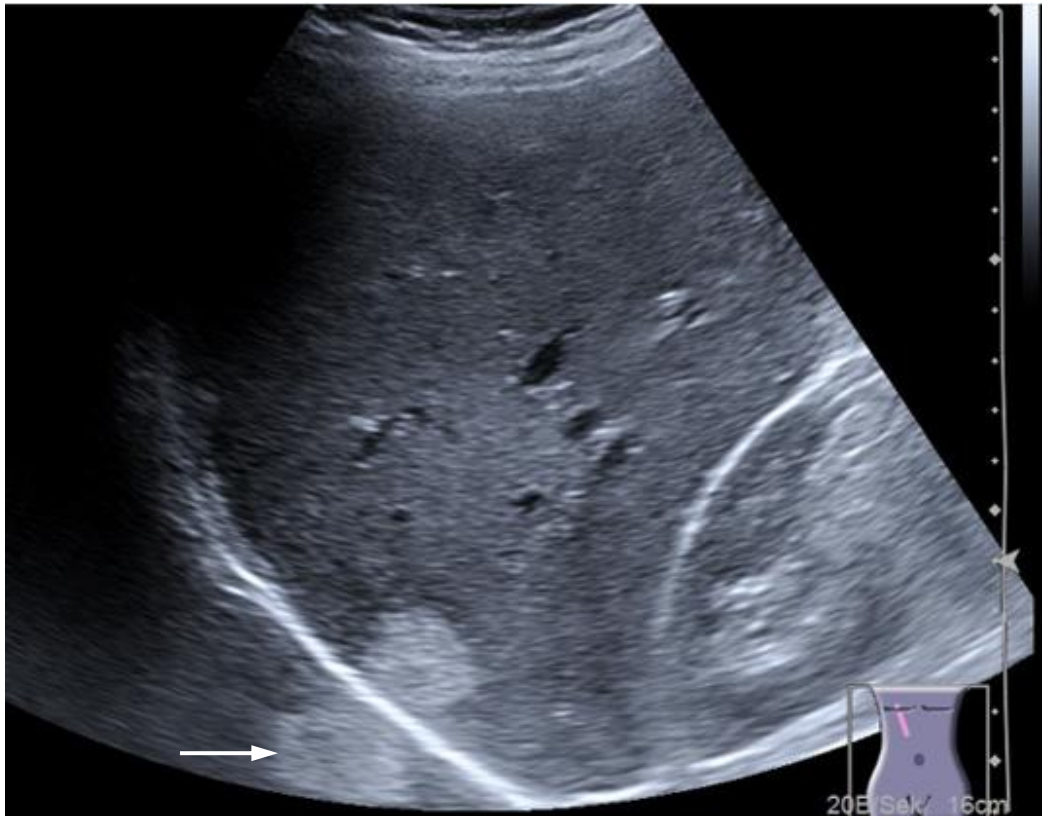
References (J Korean Soc Radiol 2022;83(4):861-875)

Question 5

Question 5 (Physics, Difficulty: Low)

Q. What is the major physical phenomenon for the findings indicated by the white arrows in each image?



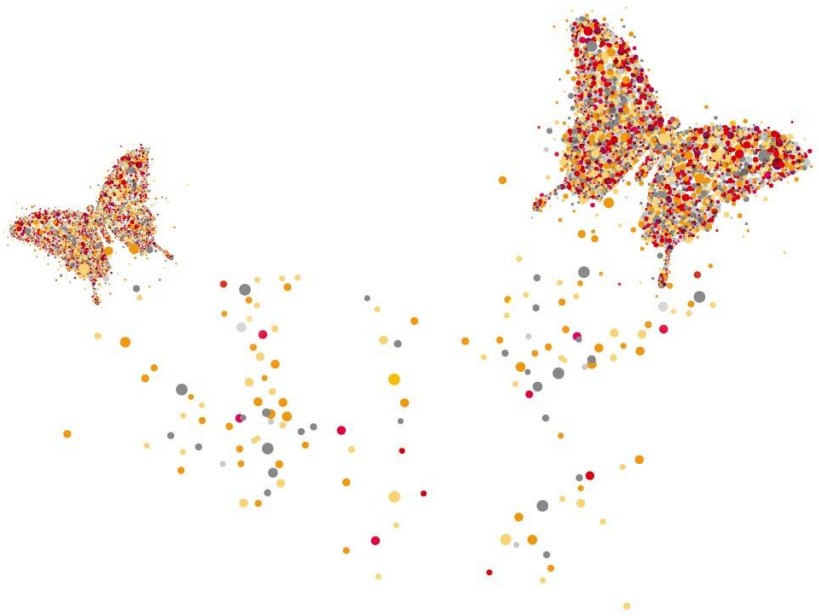


① Side lobe

② Grating lobe

③ Reflection

④ Scattering



What is the Correct Answer?

① Side lobe

② Grating lobe

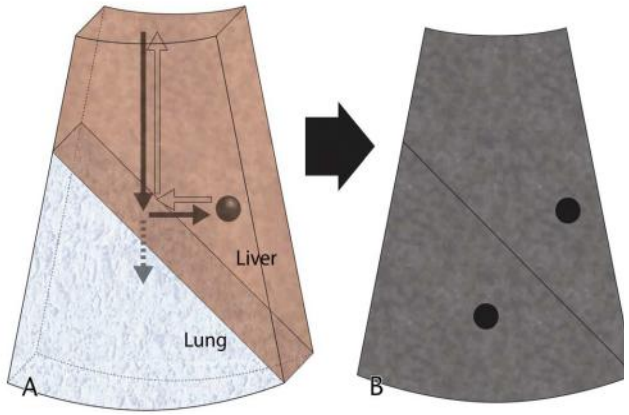
③ Reflection

④ Scattering

③ Reflection

A key assumption in ultrasound is that the reflected echoes that return to the transducer travel in a **straight line**.

Mirror image artifacts occur when the transmitted pulse and returning echo reflect off a highly reflective interface (an acoustic mirror) and **change direction** before returning to the transducer, thereby breaking this assumption.



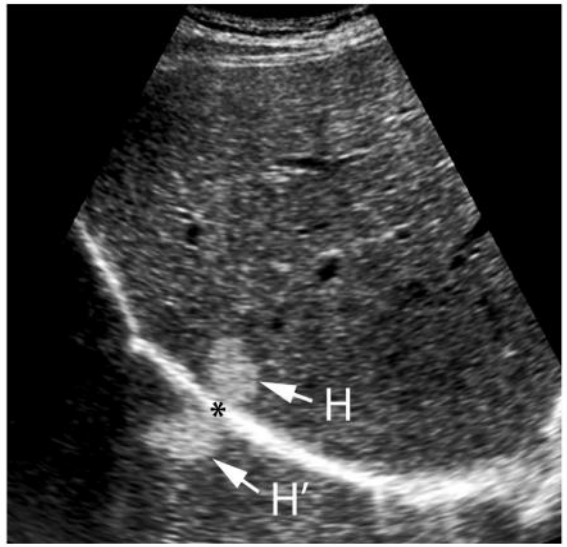
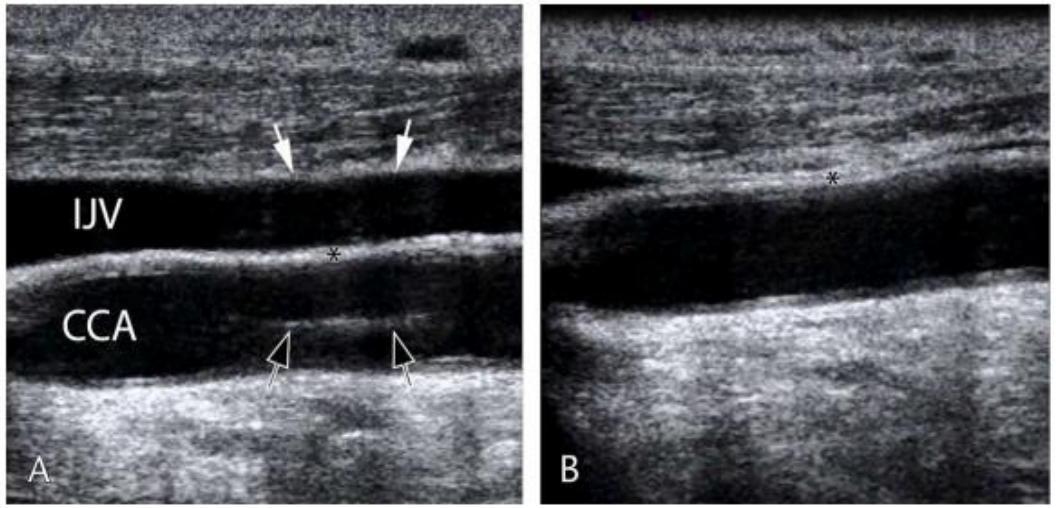


FIGURE 2. Lung mirror. Longitudinal view of the liver shows a hepatic hemangioma (H). The interface between the gas in the lung and the diaphragm (*) acts as an acoustic mirror and duplicates the hemangioma above the diaphragm (H').

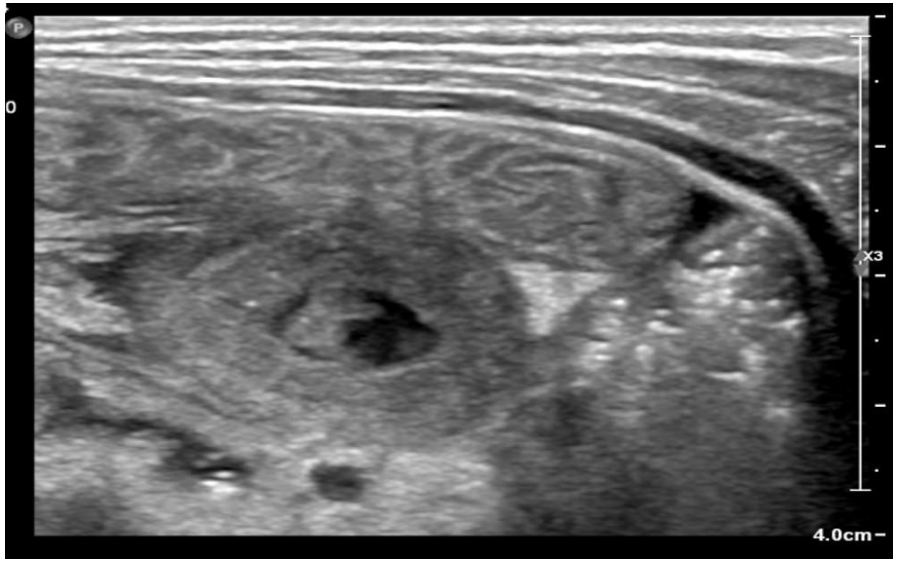


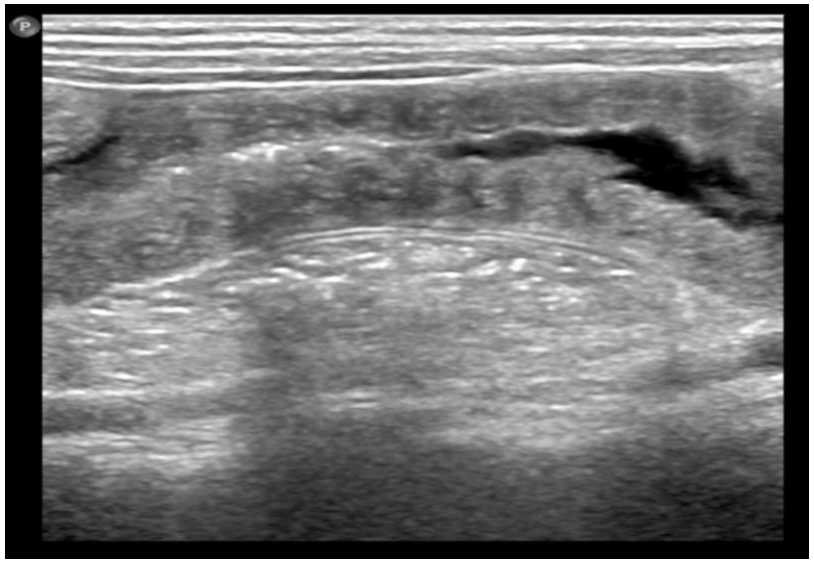
References Ultrasound Quarterly 2020;36: 287 – 299

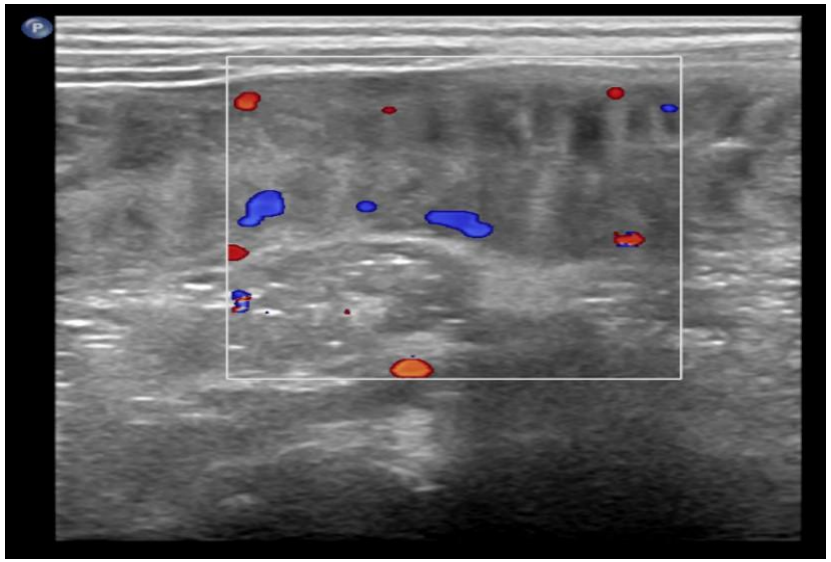
Question 6

Question 6 (Pediatric, Difficulty: Low)

Q. A 3-year-old male. Abdominal pain with reddish-purple spots on the legs





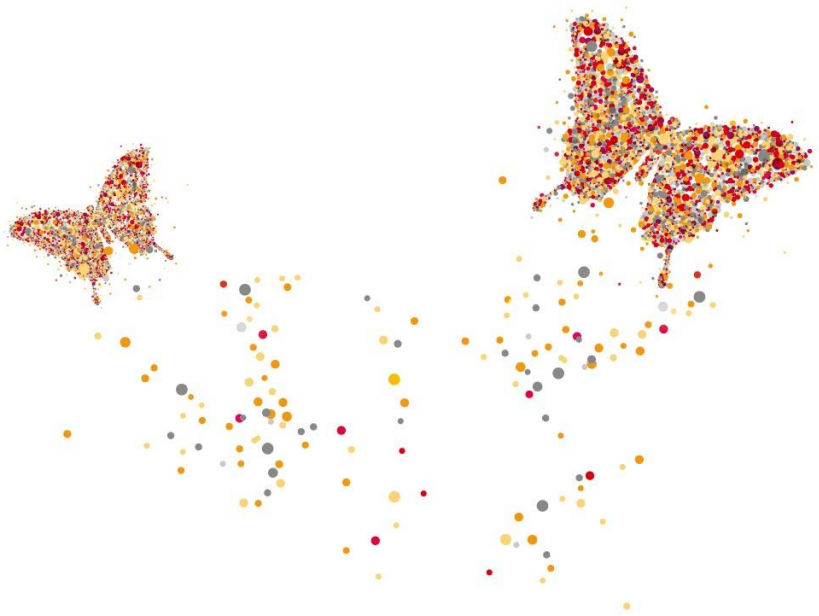


① Intussusception

② Henoch-Schonlein purpura

③ Necrotizing enterocolitis

④ Crohn's disease



What is the Correct Answer?

① Intussusception

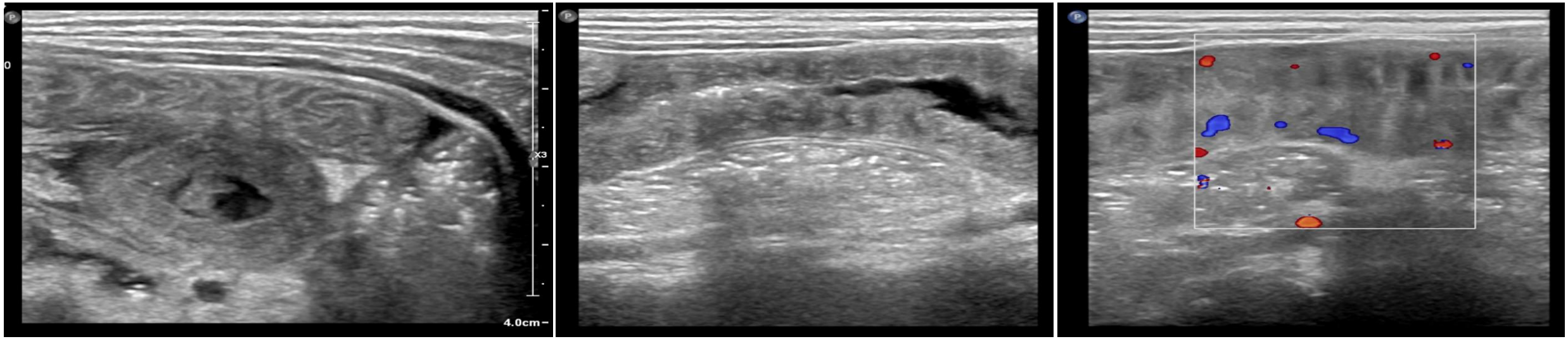
② Henoch-Schonlein purpura

③ Necrotizing enterocolitis

④ Crohn's disease

② Henoch-Schonlein purpura

- Long segmental, concentric bowel wall thickening involving proximal small bowel on US.
- Systemic vasculitis affects small vessels in the skin, joint, GI tract and kidney

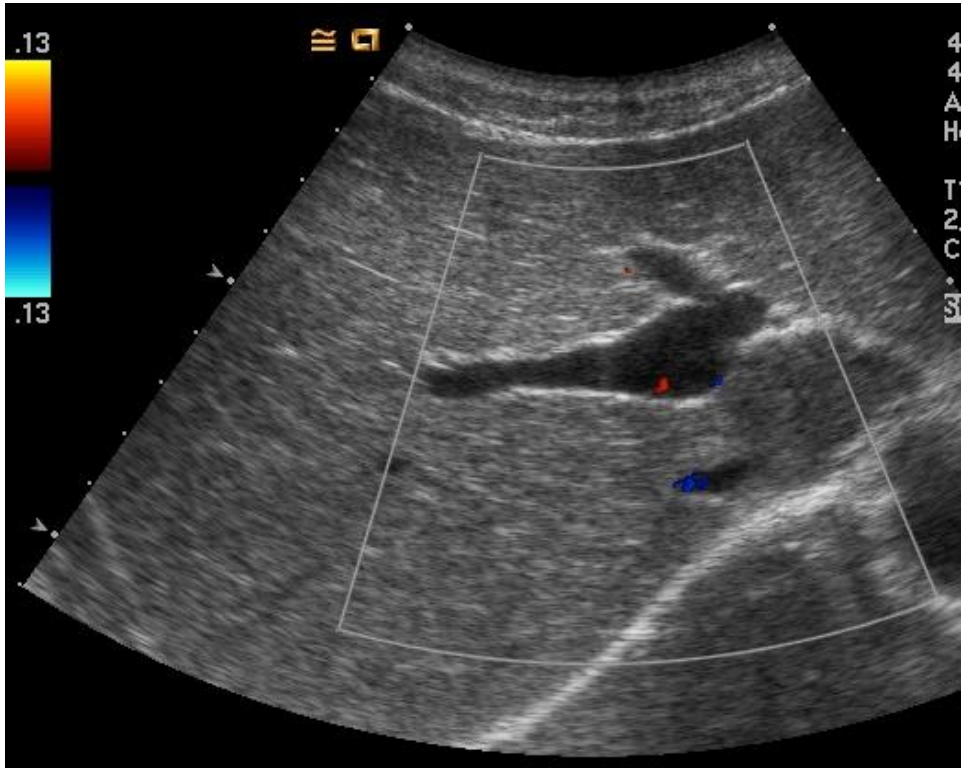


References (J Pediatr Gastroenterol Nutr. 2008 Jan;46(1):48-53.)

Question 7

Question 7 (Abdomen, Difficulty: Medium)

Q. A color Doppler image of a normal liver. What is the most appropriate adjustment to visualize the flow within the portal vein?

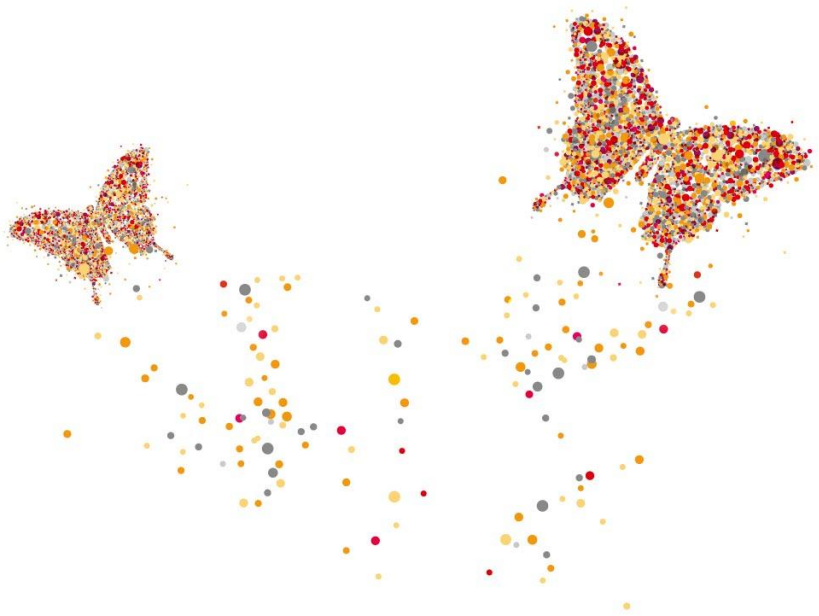


① Change to a higher frequency transducer

② Lower the velocity scale

③ Increase the wall filter

④ Increase the color Doppler gain



What is the Correct Answer?

① Change to a higher frequency transducer

② Lower the velocity scale

③ Increase the wall filter

④ Increase the color Doppler gain

References Mitchell DG. Color Doppler imaging: principles, limitations, and artifacts. Radiology 1990;177:1-10.

② Lower the velocity scale

In color Doppler imaging, the **Velocity Scale (or Pulse Repetition Frequency, PRF)** must be adjusted according to the expected speed of the blood flow.

- **High Scale:** Used for fast-moving flow (e.g., arterial flow) to prevent aliasing.
- **Low Scale:** Used for slow-moving flow (e.g., venous flow like the portal vein).

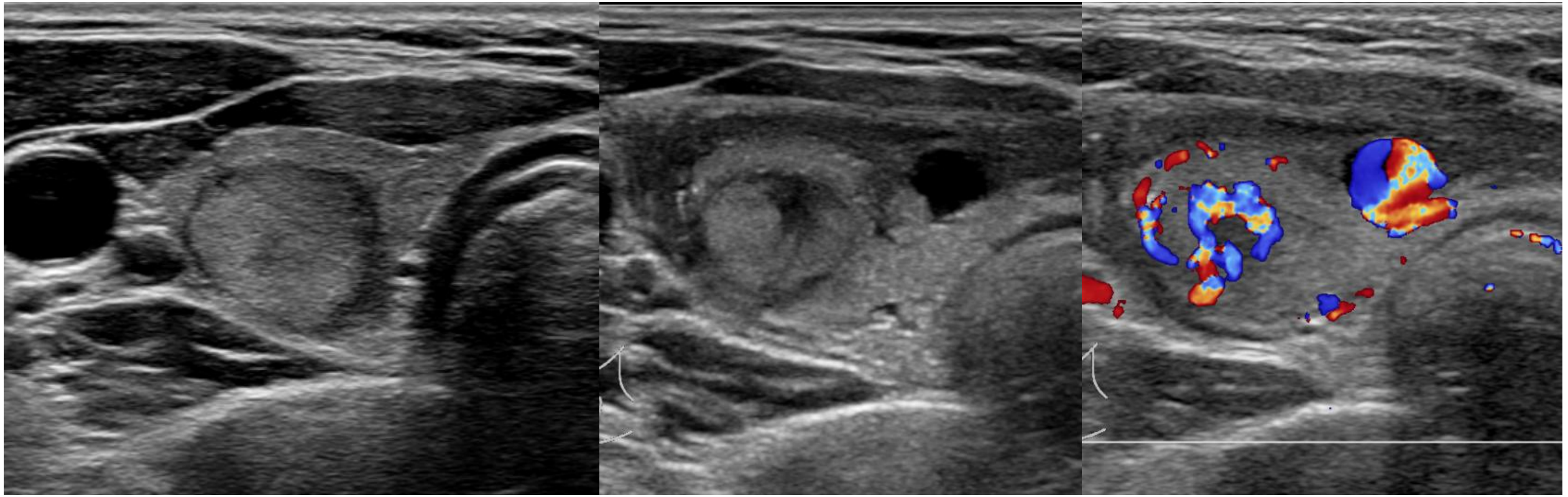
If the scale is set too high (as seen in the image's scale bar of .13), the system becomes insensitive to the low-frequency shifts produced by slow-moving blood, resulting in a "void" of color. **Lowering the velocity scale** increases the sensitivity to slow flow and allows the portal vein to be properly filled with color.

References Mitchell DG. Color Doppler imaging: principles, limitations, and artifacts. Radiology 1990;177:1-10.

Question 8

Question 8 (Thyroid, Difficulty: Low)

Q. A 34-year-old woman presented painful swelling in right anterior neck after right thyroid biopsy. What is your diagnosis?

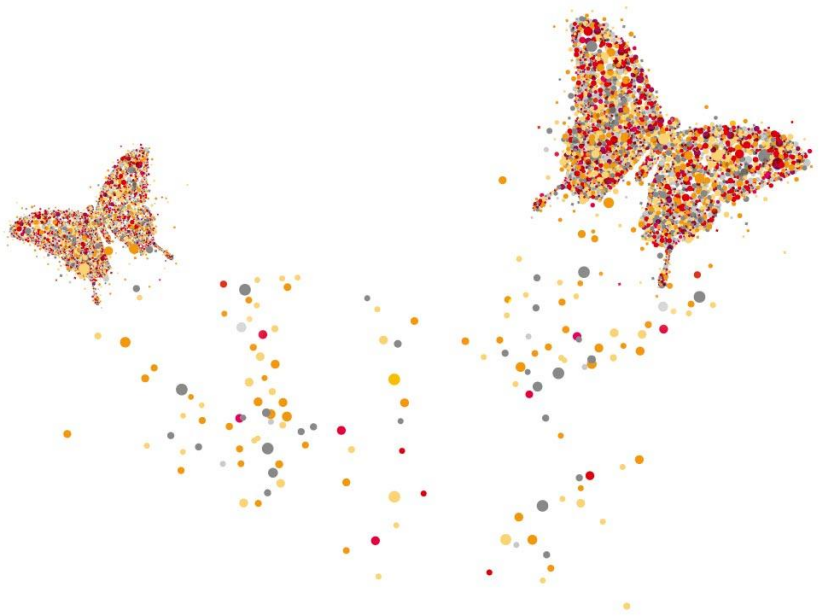


① Subcapsular hematoma

② Hemorrhagic thyroid cyst

③ Iatrogenic pseudoaneurysm

④ Intraparenchymal hemorrhage



What is the Correct Answer?

① Subcapsular hematoma

② Hemorrhagic thyroid cyst

③ Iatrogenic pseudoaneurysm

④ Intraparenchymal hemorrhage

③ Iatrogenic pseudoaneurysm

- Rare complication after Bx.
- Symptoms: swelling to respiratory distress by tracheal compression
- **Typical "swirling motion" flow on Doppler US**

Treatment:

Spontaneous thrombosis

Compression

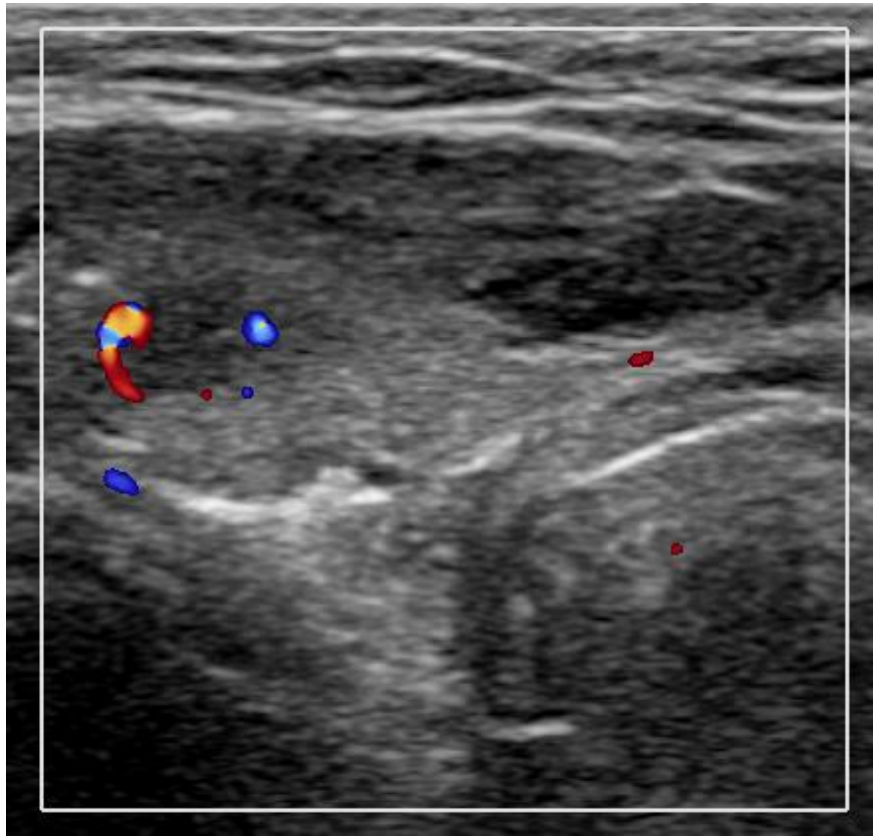
Thrombin injection

Coil embolization

OP: Surgical ligation/Lobectomy

RFA

Collapse after manual probe compression for 30 min

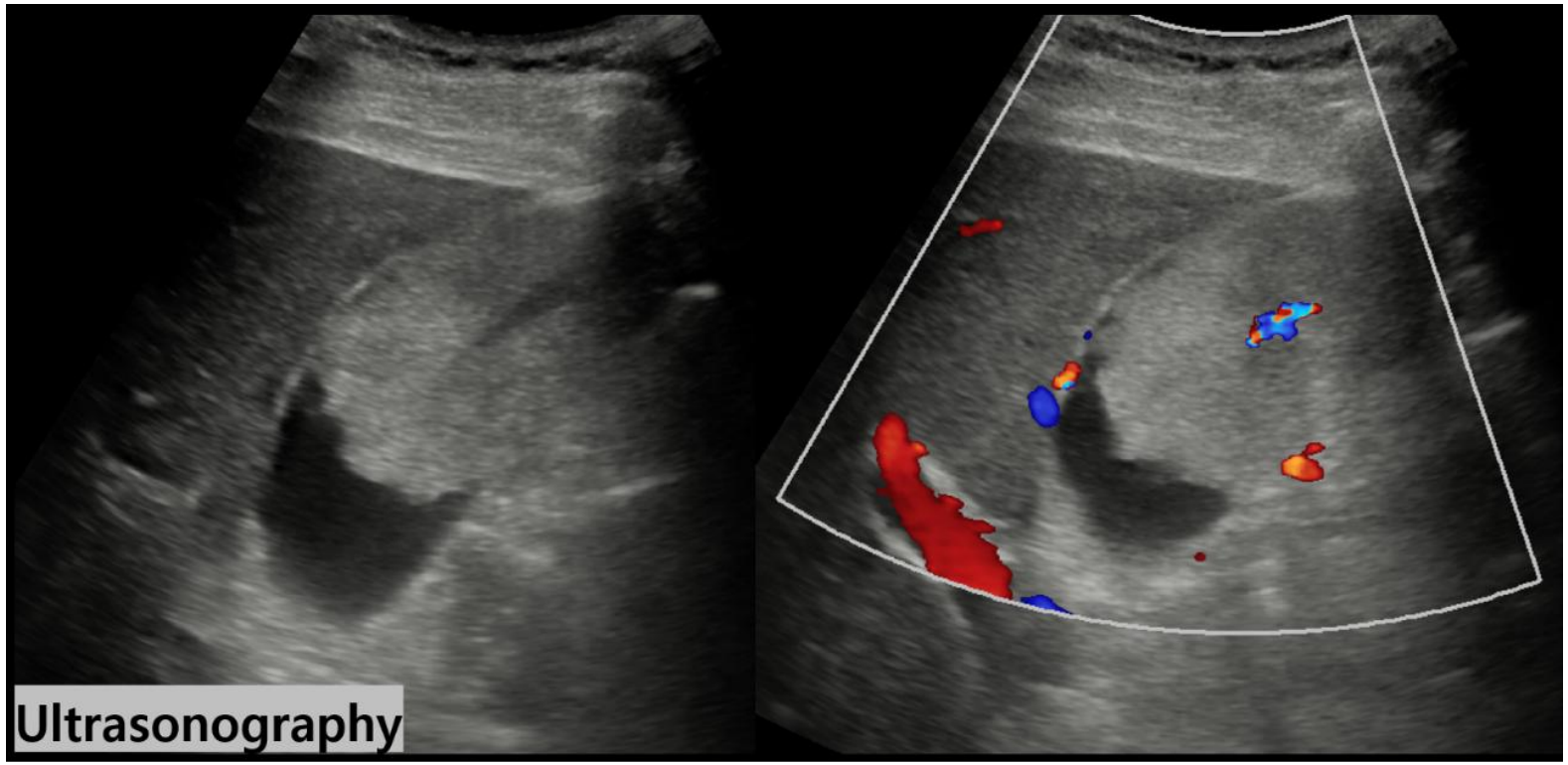


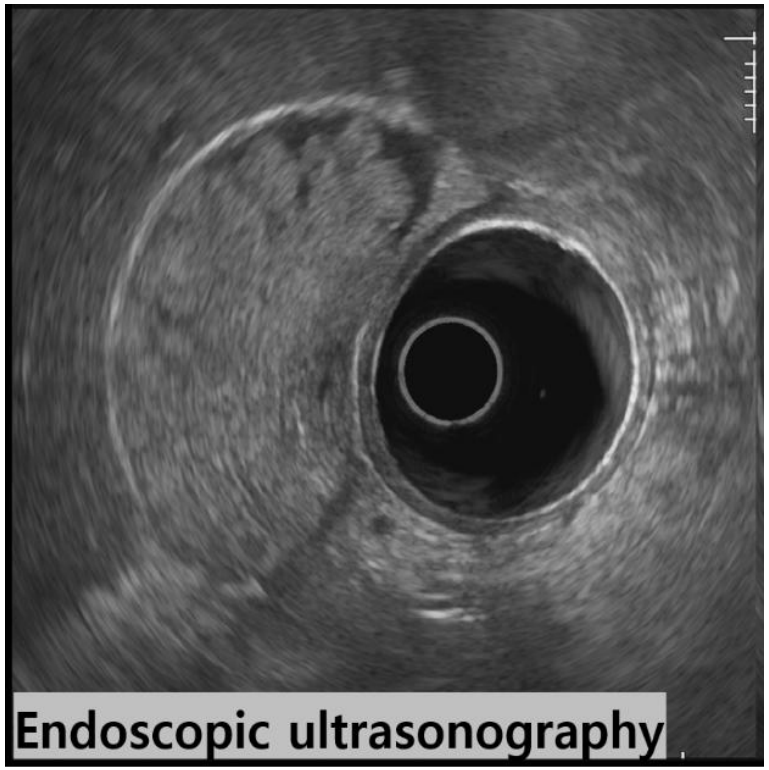
References Ha et al. Eur Radiol (2017) 27:1186–1194
Jun et al. J VascIntervRadiol (2016) 27:1613–1617

Question 9

Question 9 (Abdomen, Difficulty: Medium)

Q. A 73-year-old man with incidentally found GB mass. What is your diagnosis?



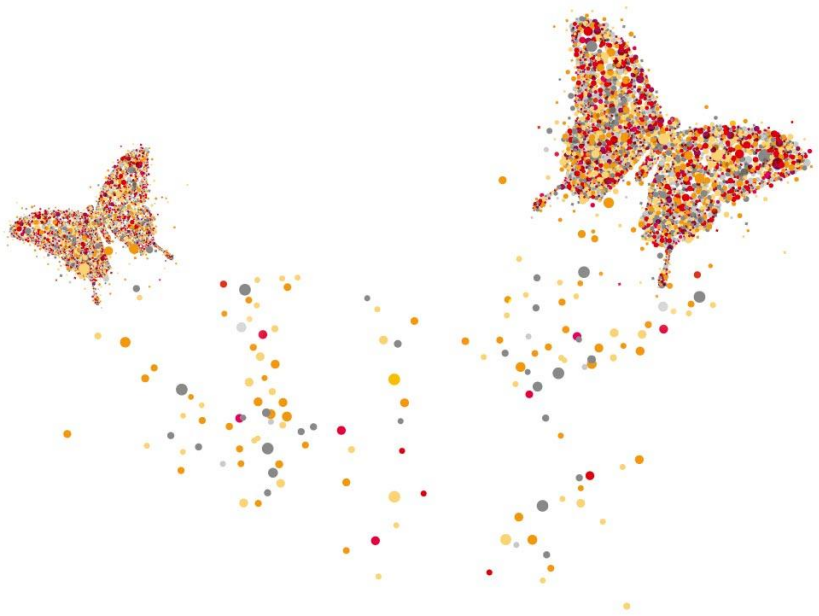


① Tumefactive sludge

② Gallbladder adenocarcinoma

③ Intracholecystic papillary neoplasm

④ Adenomyomatosis of the gallbladder



What is the Correct Answer?

① Tumefactive sludge

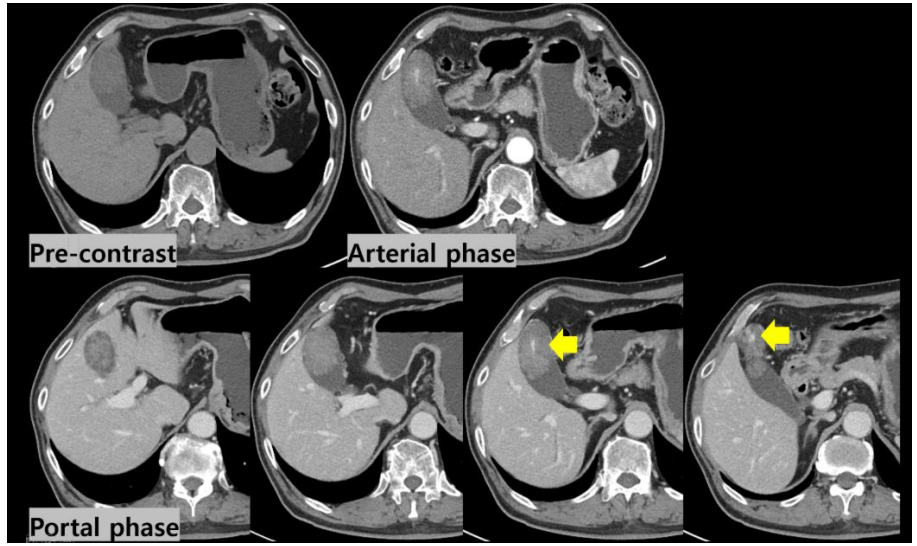
② Gallbladder adenocarcinoma

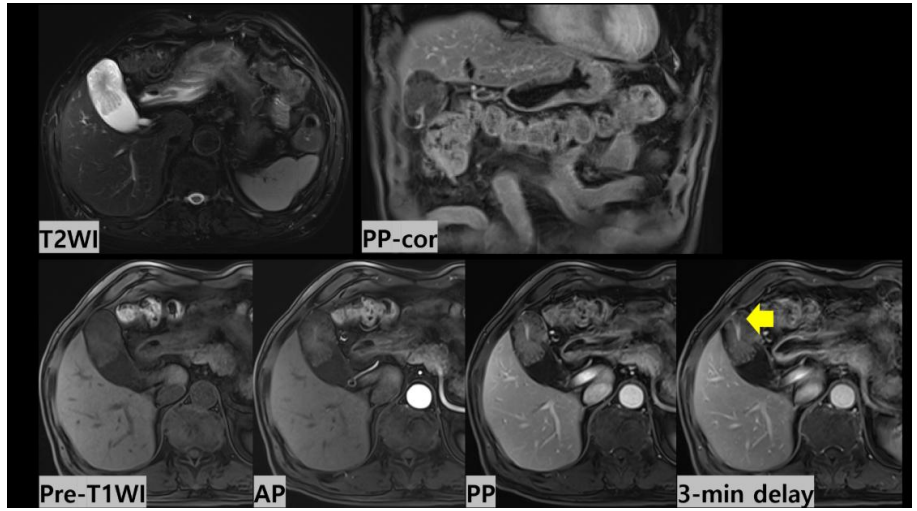
③ Intracholecystic papillary neoplasm

④ Adenomyomatosis of the gallbladder

③ Intracholecystic Papillary Neoplasm (ICPN)

- Rare entity (~0.5–0.6% of gallbladder neoplasms)
- Preinvasive gallbladder neoplasm composed of dysplastic epithelial cells forming clinically detectable mass (≥1 cm)
  - Considered analogous to: IPNB (bile duct), IPMN / ITPN of pancreas
- Polypoid intraluminal mass, usually no significant GB wall thickening





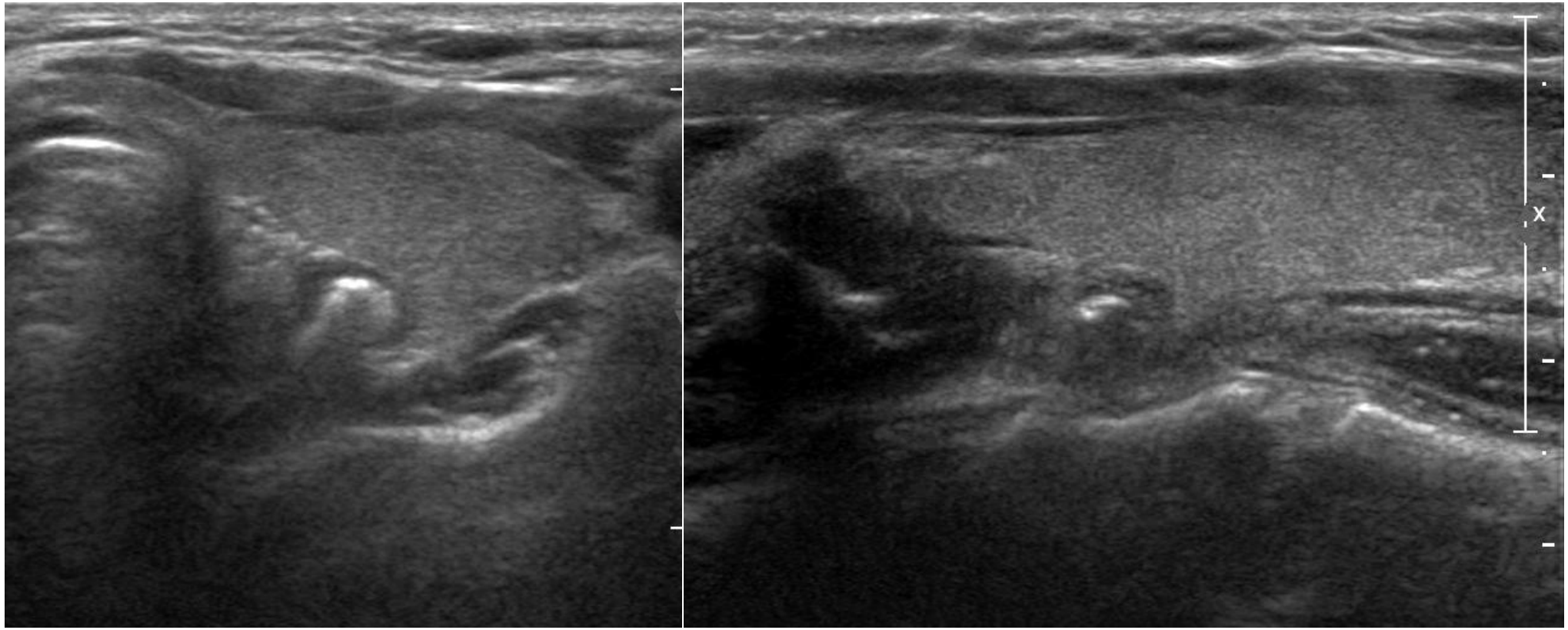
Clinical Management Considerations

- Often not suspected preoperatively
- Many cases treated surgically due to concern for GB adenocarcinoma:
  - Cholecystectomy/ Radical cholecystectomy when malignancy is suspected
- No established specific management guideline

Question 10

Question 10 (Thyroid, Difficulty: Low)

Q. A 35-year-old woman showed nodular lesion in left thyroid during screening US. What is your diagnosis?

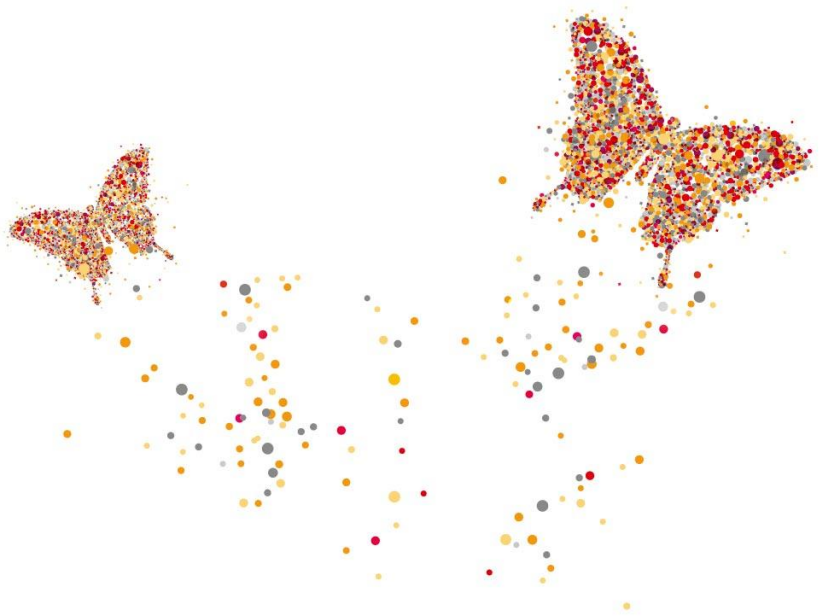


① Colloid cyst

② Parathyroid adenoma

③ Papillary thyroid carcinoma

④ Esophageal diverticulum



What is the Correct Answer?

① Colloid cyst

② Parathyroid adenoma

③ Papillary thyroid carcinoma

④ Esophageal diverticulum

Killian-Jamieson diverticulum

④ Esophageal diverticulum

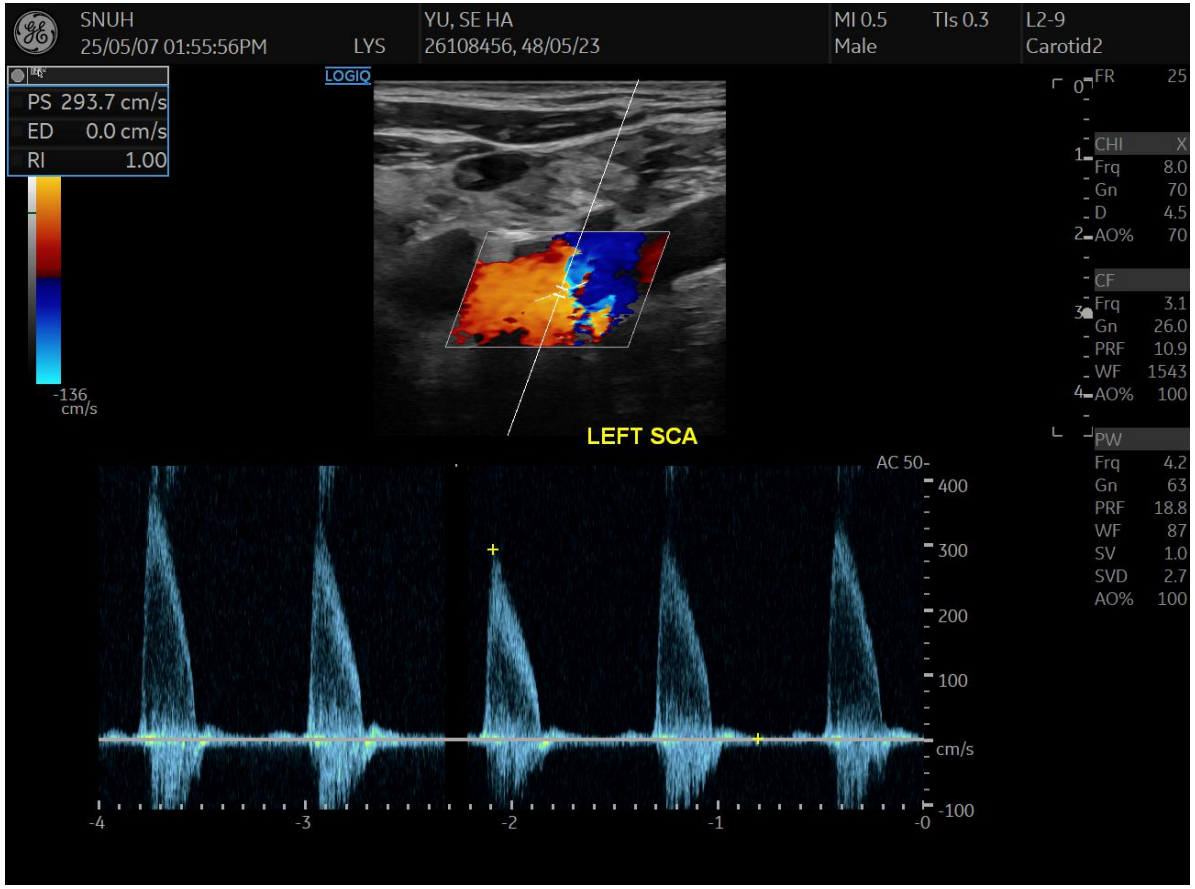
- Can be misdiagnosed as thyroid nodules with calcifications
- US finding: changes in the shape and internal shadowing during swallowing, connection to the esophagus, boundary hypoechoic zone that is suggestive of the stratal structure of the digestive tract

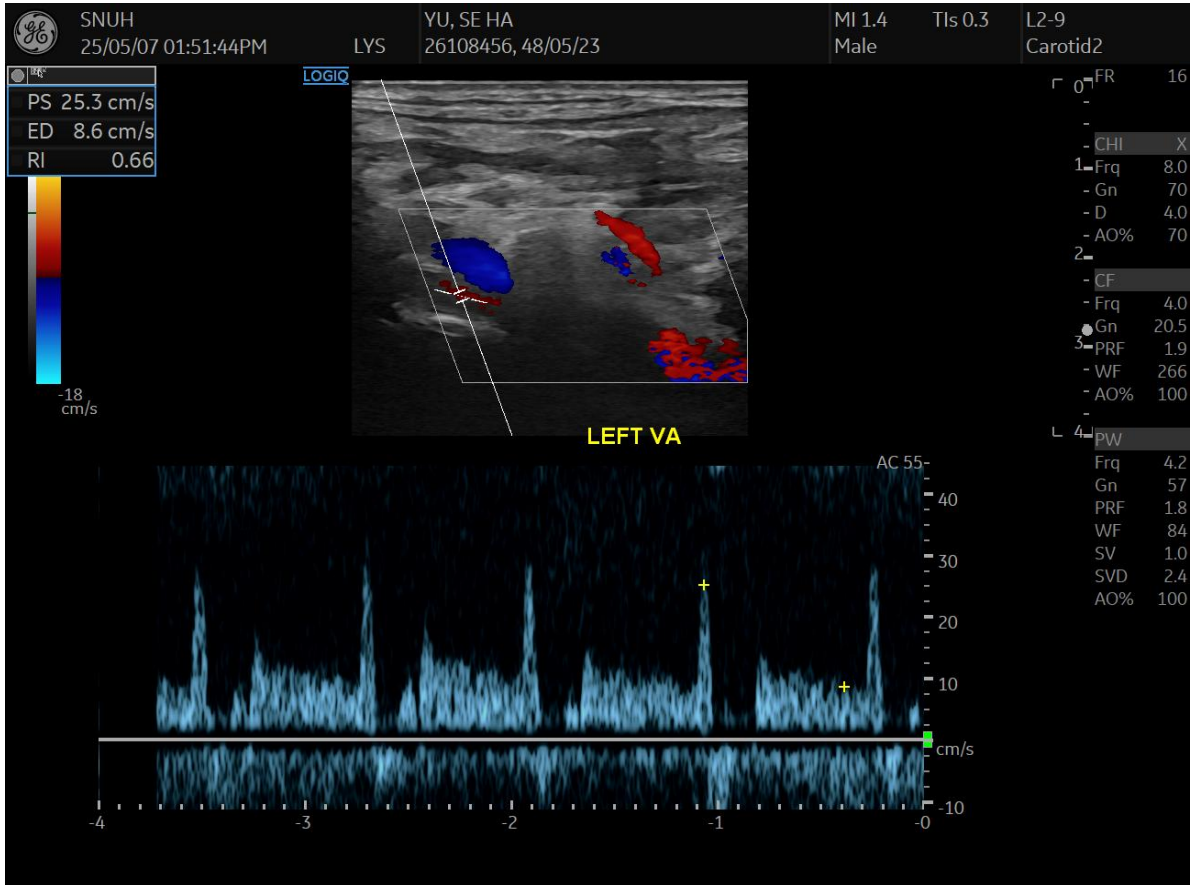
- Zenker diverticulum: common, originates on the posterior wall of the pharyngoesophageal segment just above the cricopharyngeus muscle
- Killian-Jamieson diverticulum: rare, protrudes through the muscular gap in the anterolateral wall of the proximal cervical esophagus inferior to the cricopharyngeus muscle

Question 11

Question 11 (Cardiovascular, Difficulty: Medium)

Q. This is an incidental ultrasound finding detected during carotid Doppler examination in a 67-year-old man. Which animal is most closely associated with the finding observed in the left vertebral artery (VA)?



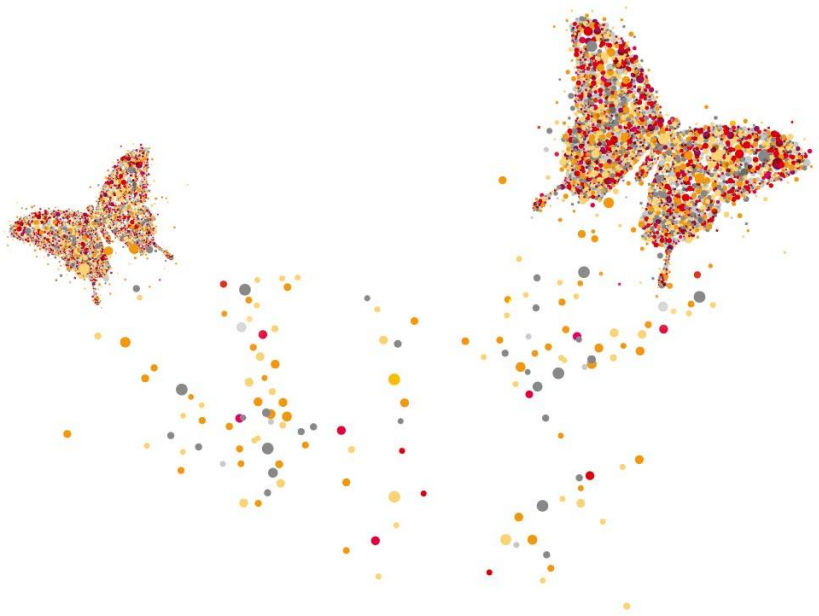


①

②

③

④



What is the Correct Answer?

①

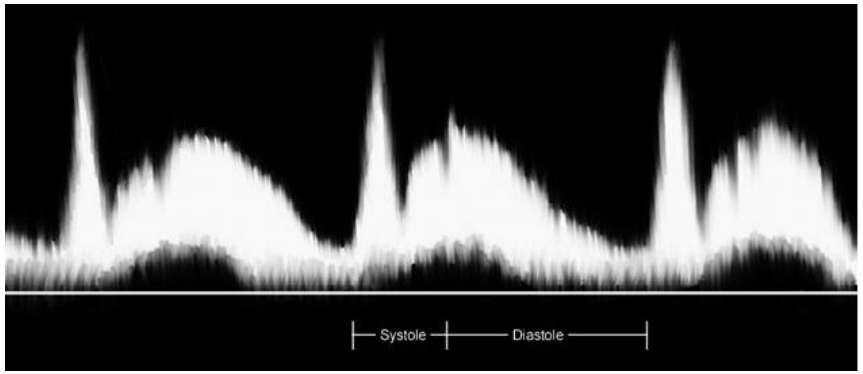
②

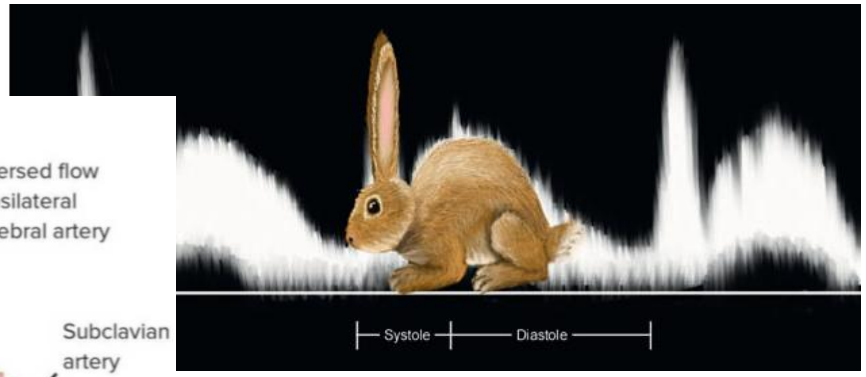
③

④

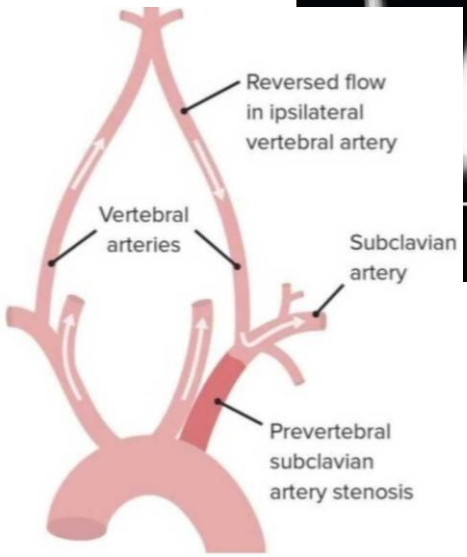
④ Bunny sign (vertebral artery "pre-steal" waveform)

- In subclavian steal syndrome, a **proximal subclavian artery (SCA) lesion** causes the **vertebral artery (VA)** to act as a collateral pathway. With **complete occlusion**, VA flow can become **fully retrograde** ("steal").
- **Early / pre-steal stage**: When there is **stenosis (not occlusion)**, VA flow often remains **antegrade**, but the Doppler waveform becomes abnormal.





- **Key Doppler feature: Mid-systolic notch** on VA duplex ultrasound.
  The **depth of the notch correlates with stenosis severity**
  - Graded **Type 1–4**: from a mild notch to a notch that reaches/below the baseline.
- **Why "bunny":** The **Type 2 waveform** resembles a **bunny**:
  - **Ears** = systolic peaks
  - **Neck** = the **mid-systolic notch**
  - **Body** = the diastolic component/peak

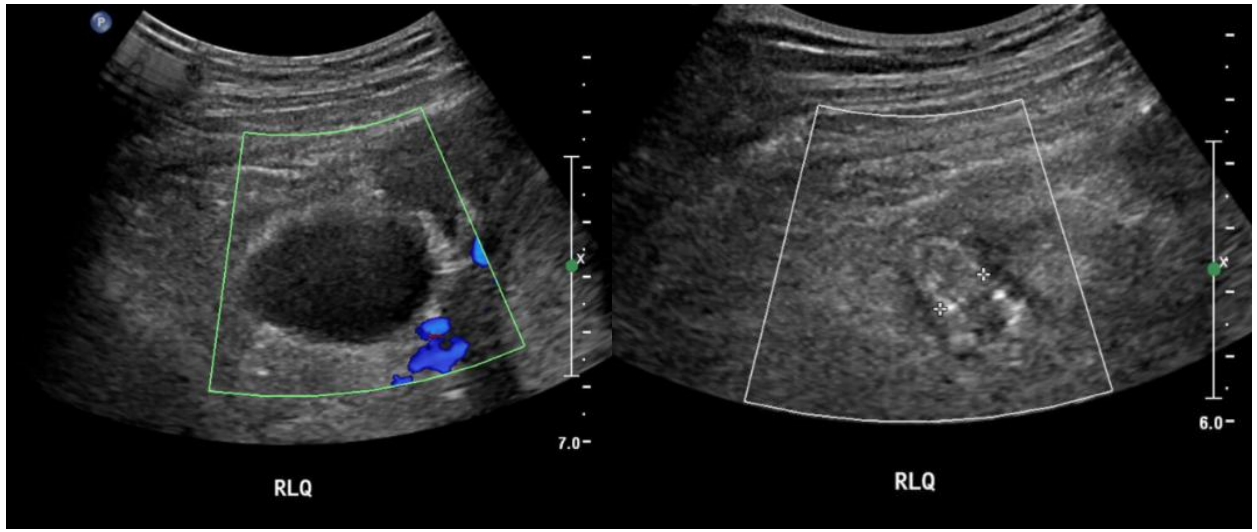


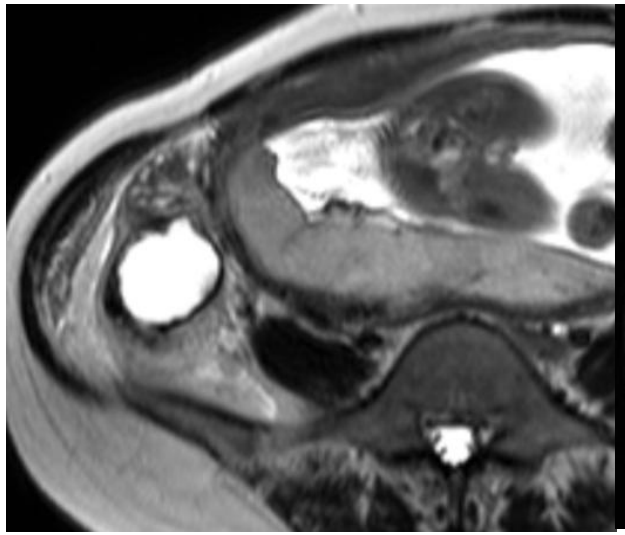
References
J Med Imaging Radiat Oncol 2018;62 Suppl 1:22.

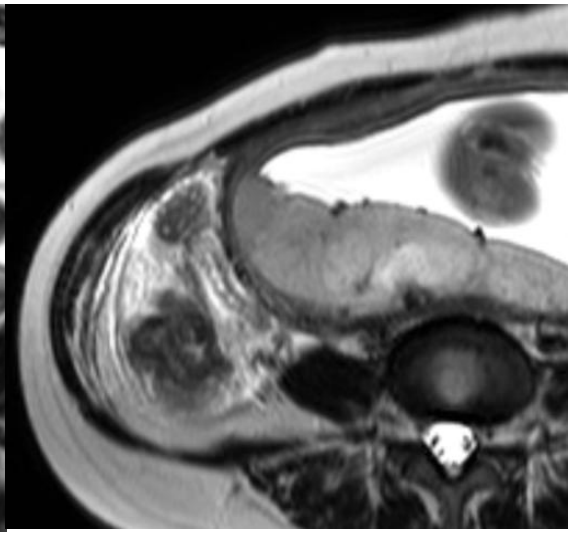
Question 12

Question 12 (Genitourinary, Difficulty: Medium)

Q. A 36-year-old pregnant women with abdominal pain. What is the best diagnosis?





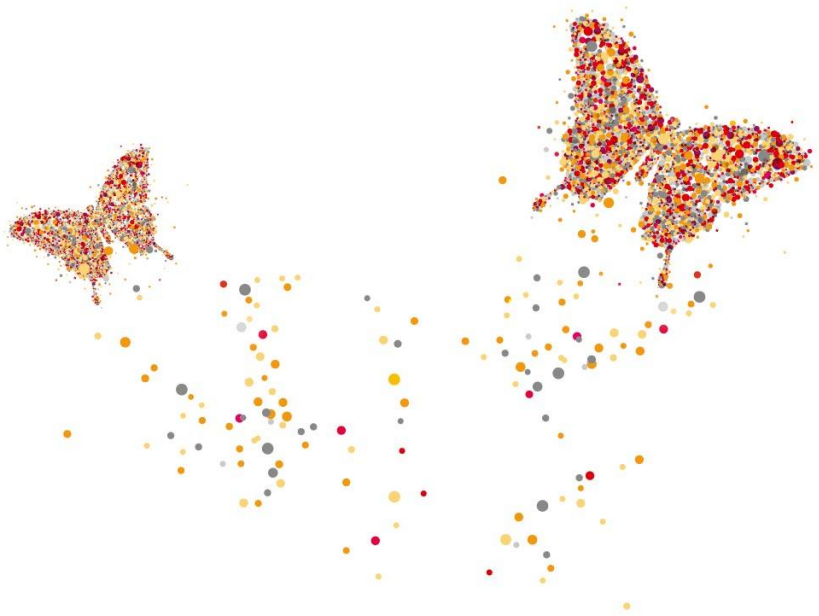


① Ovarian torsion

② Ovarian abscess

③ Acute appendicitis

④ Small bowel duplication cyst



What is the Correct Answer?

① Ovarian torsion

② Ovarian abscess

③ Acute appendicitis

④ Small bowel duplication cyst

② Ovarian abscess

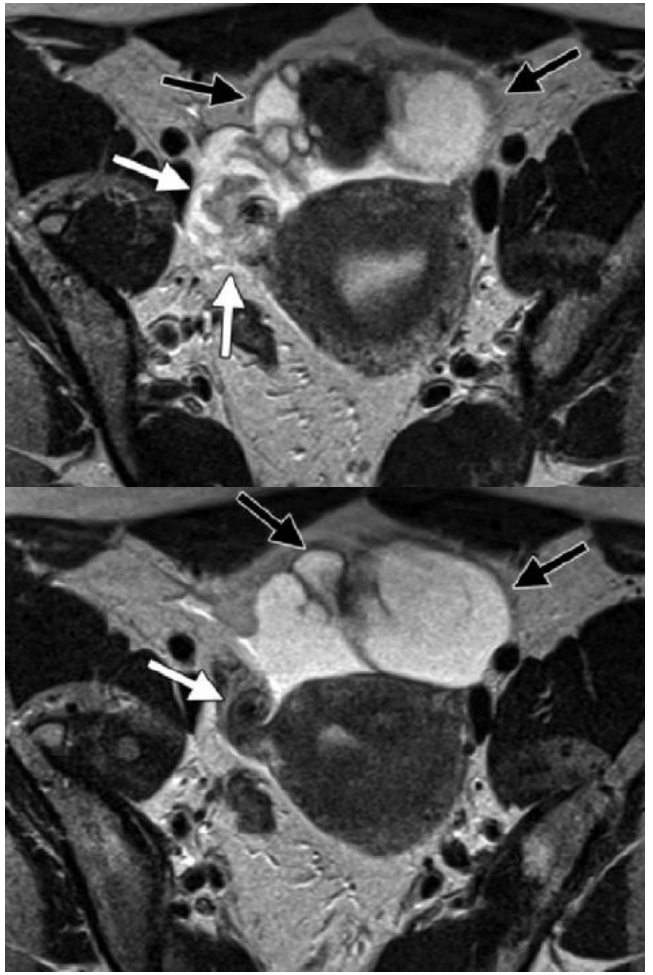
Rt. ovary: grossly normal
The right tube was twisted approximately 720 degrees in a clockwise direction, and an old bloody chestnut-sized hematoma was noted.

Right salpinx, sapingectomy:
Serous cystadenoma with secondary inflammation and vascular dilatation.

References (RadioGraphics 2012; 32:317–334)

- Adnexal Torsion of Pregnant Patient
  - 7% of known ovarian masses in pregnancy
- Clinical overlap with acute appendicitis
  - nausea, vomiting, pelvic pain
- Similar incidence as appendicitis (1/1800)

- Most often in the first trimester
  - during rapidly increasing size of uterus
- MR imaging
  - enlarged ovary
  - thickened, twisted fallopian tube

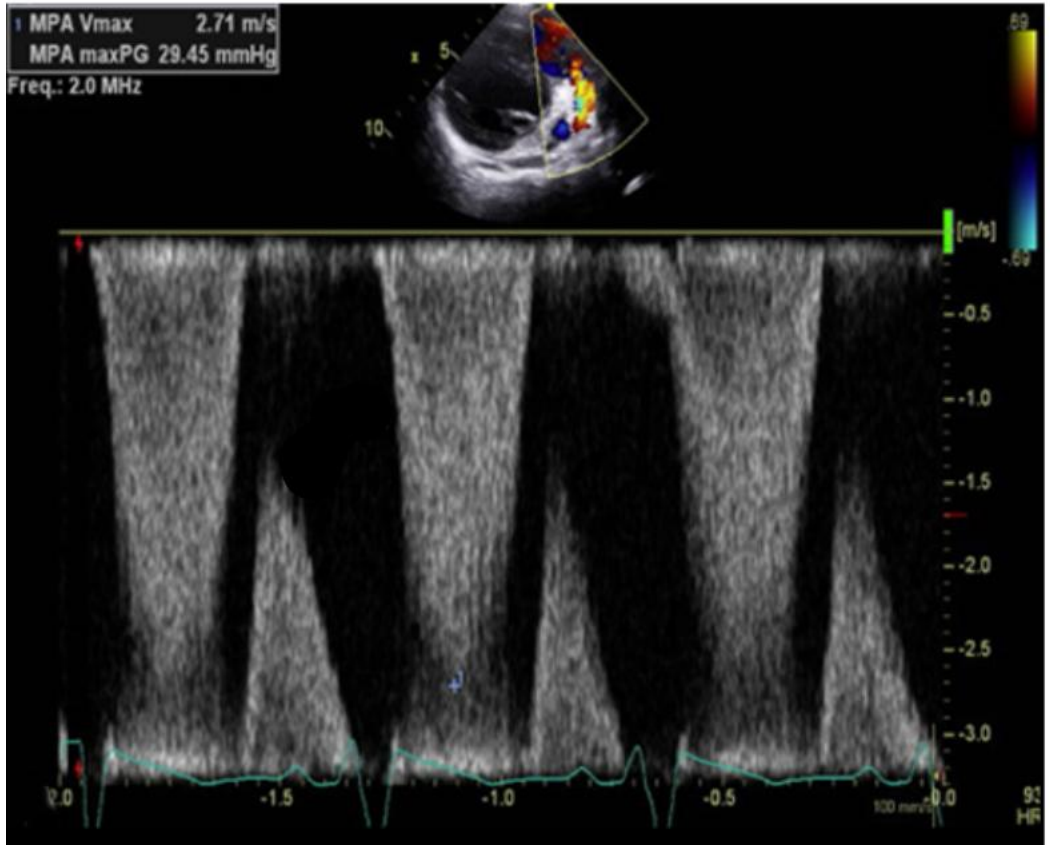


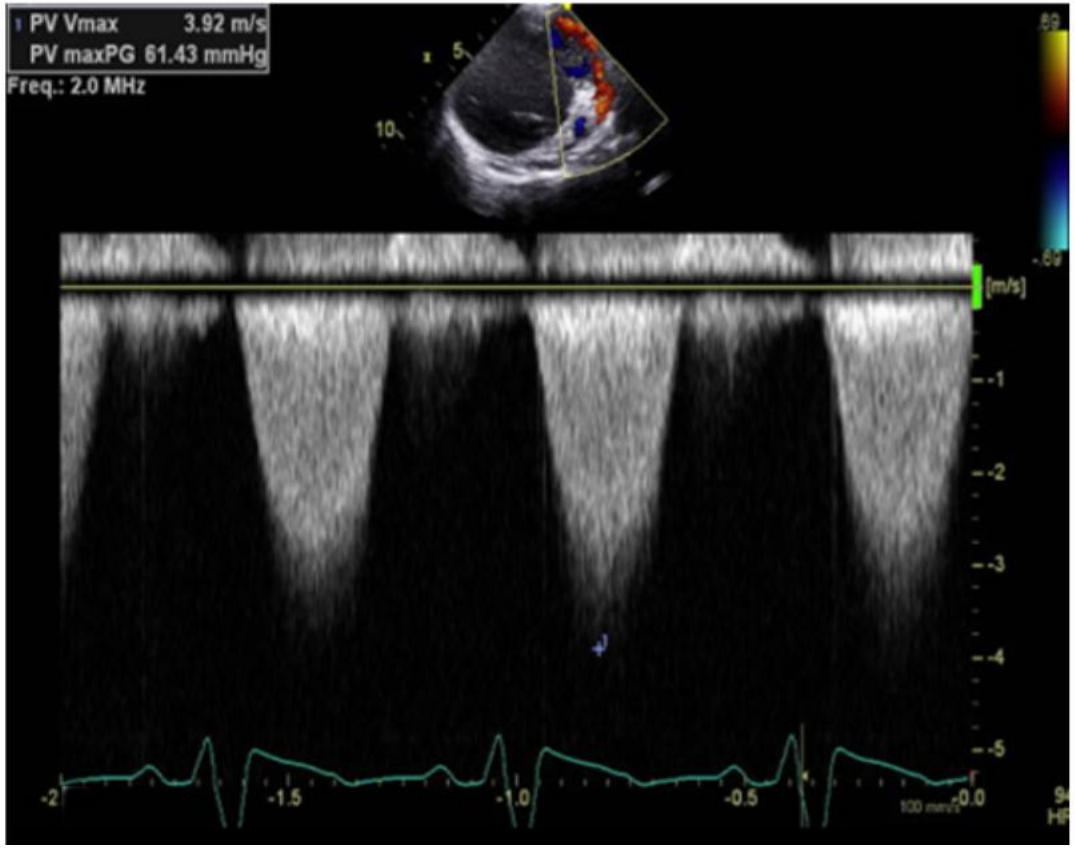
References (RadioGraphics 2012; 32:317–334)

Question 13

Question 13 (Physics, Difficulty: Medium)

Q. Following two images compare two different spectral Doppler modes from pulmonary artery. Please find a right analysis of the images



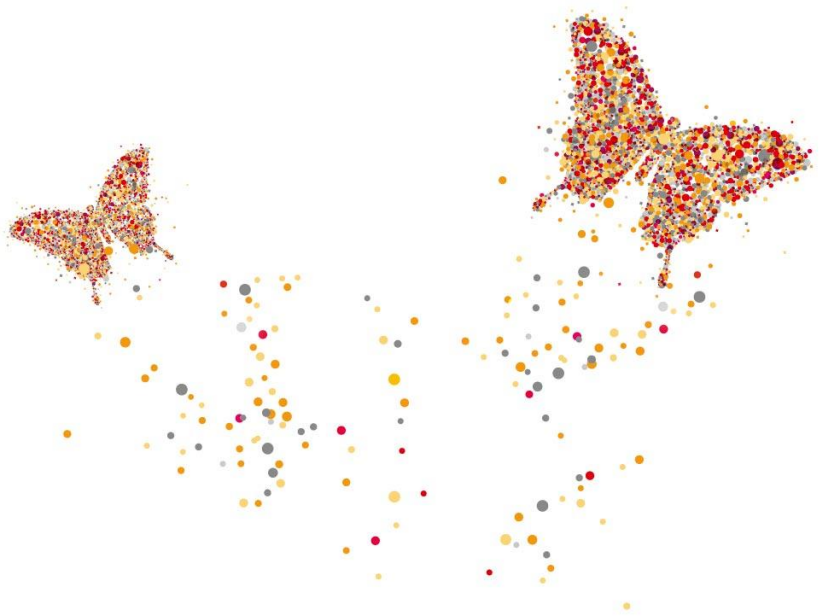


① Image A is acquired by continuous Doppler mode

② Image B is acquired by pulsed Doppler mode

③ Aliased spectrum shown in image A can be reduced by increasing the transmit frequency

④ Aliased spectrum shown in image A may be reduced by increasing the PRF



What is the Correct Answer?

① Image A is acquired by continuous Doppler mode

② Image B is acquired by pulsed Doppler mode

③ Aliased spectrum shown in image A can be reduced by increasing the transmit frequency

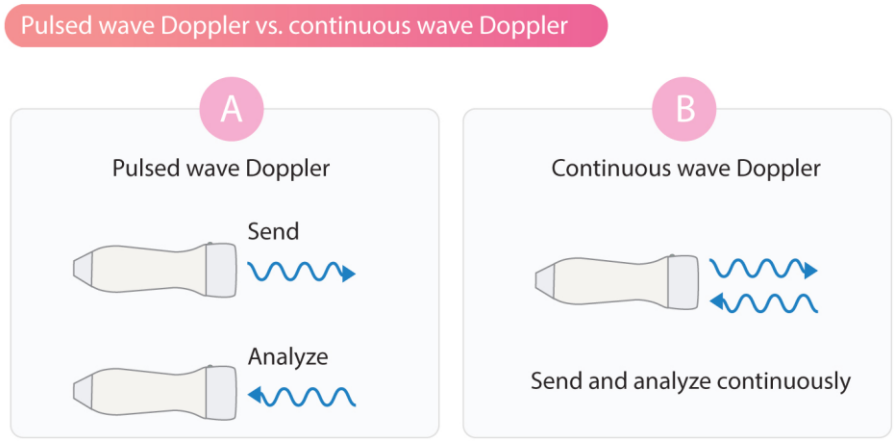
④ Aliased spectrum shown in image A may be reduced by increasing the PRF

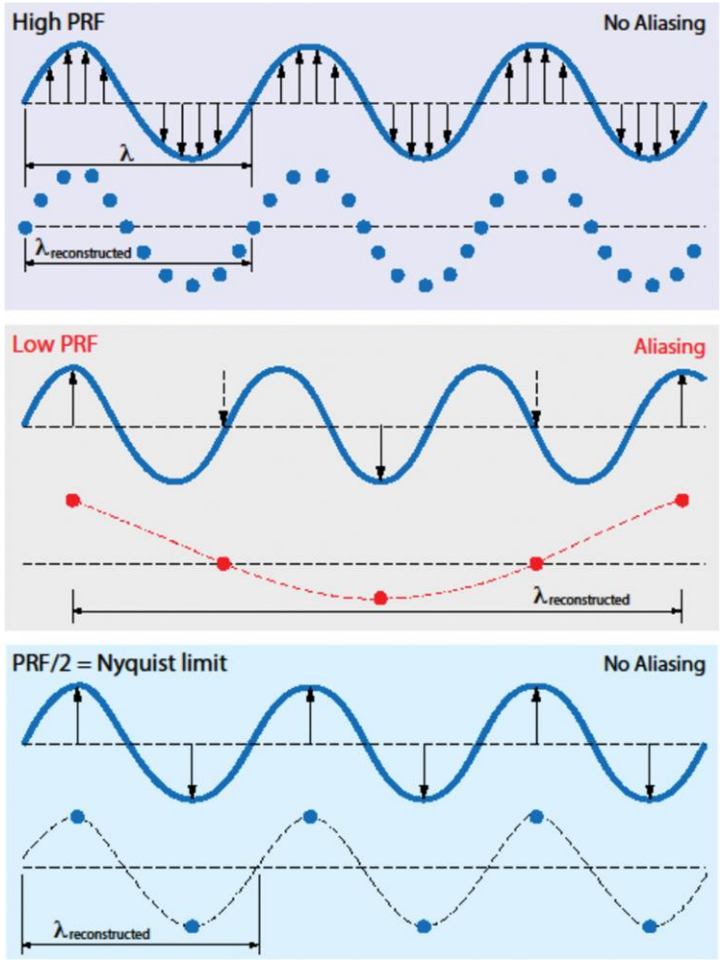
④ Aliased spectrum shown in image A may be reduced by increasing the PRF

Continuous Doppler mode does not exhibit aliasing artifacts.

Aliasing occurs as a result of an insufficient sampling rate in Pulsed wave Doppler mode.

Increasing the PRF (Pulse Repetition Frequency) has the effect of raising the sampling frequency, thereby reducing aliasing.



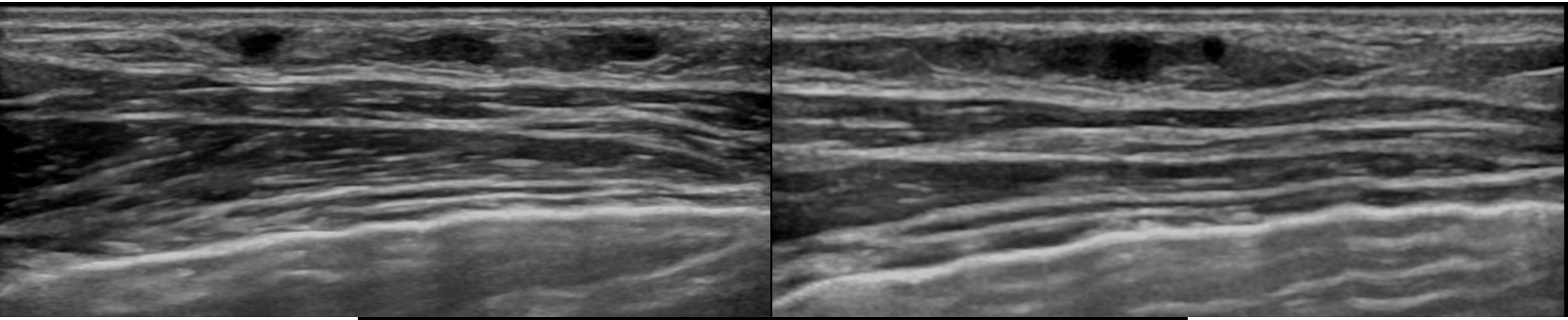


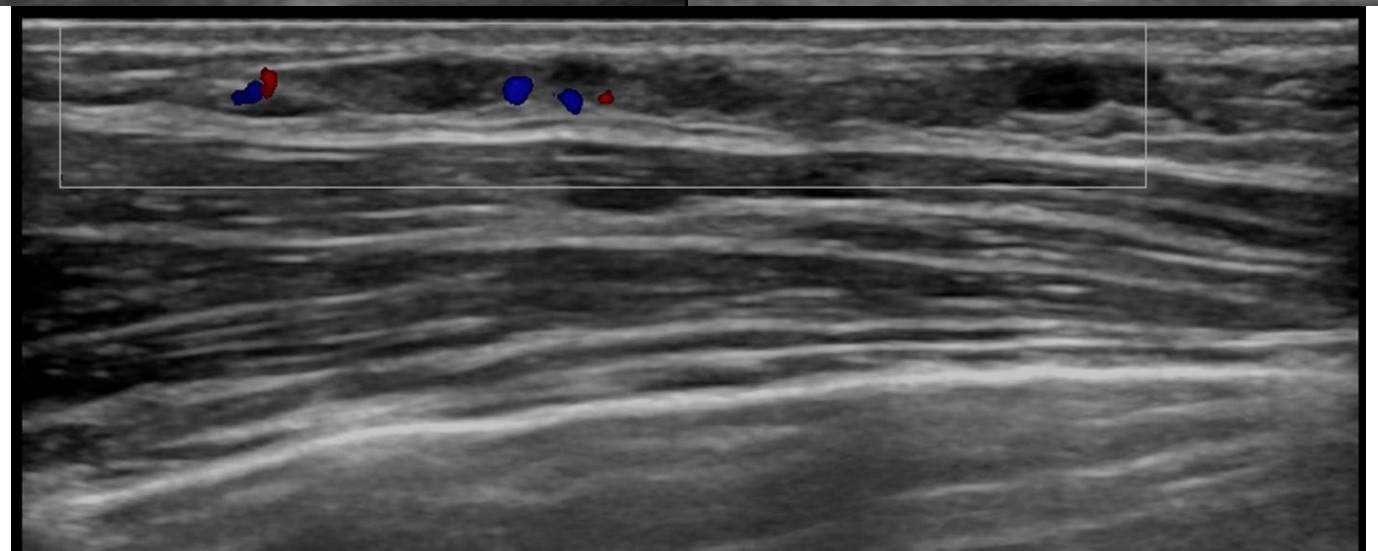
References *Radiographics. 2019 Sep-Oct;39(5):1501-1523.*
https://ecgwaves.com/topic/continuous-wave-doppler-cw-doppler/

Question 14

Question 14 (Breast, Difficulty: Medium)

Q. A 39-year-women presented with cord like palpable lesion in Rt breast. What's your diagnosis?



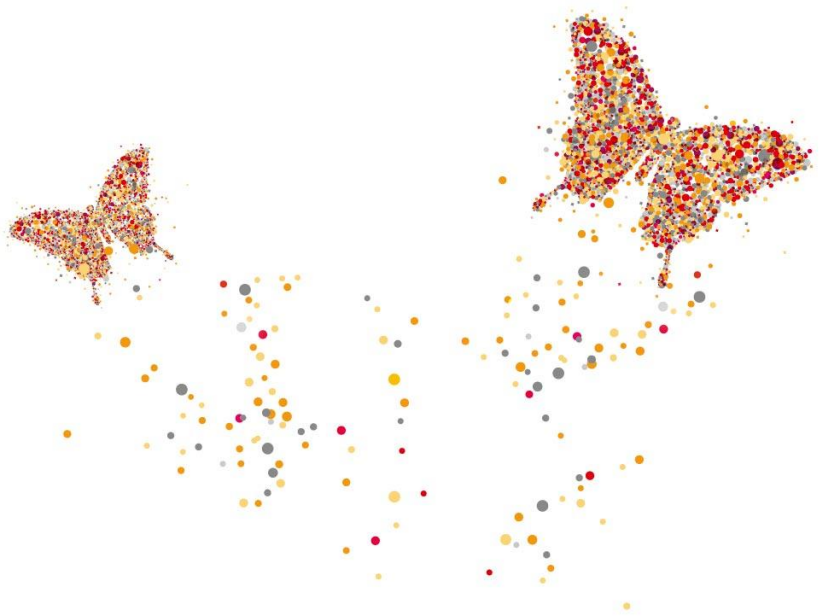


① Vascular malformation

② Lymphatics

③ Mondor's disease

④ Duct ectasia



What is the Correct Answer?

① Vascular malformation

② Lymphatics

③ Mondor's disease

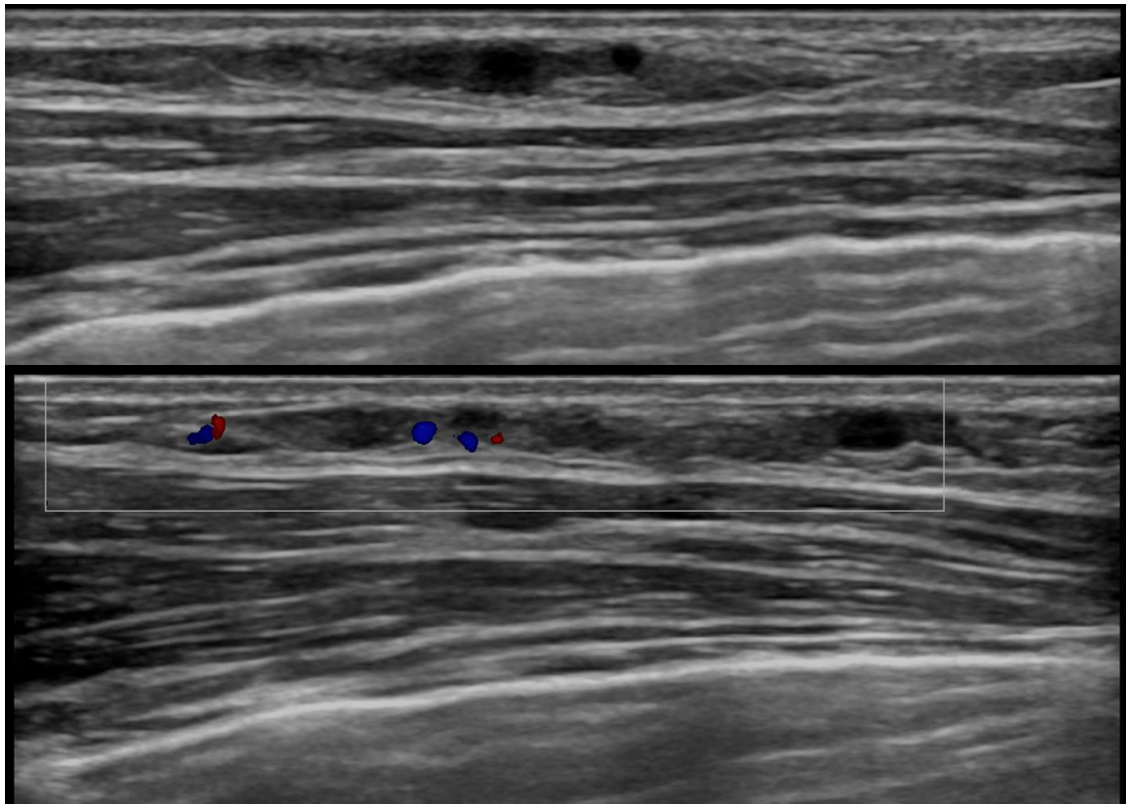
④ Duct ectasia

References (AJR Am J Roentgenol . 2001 Oct;177(4):893-6.)

③ Mondor's disease

- A rare benign thrombopheblitis characterized by superficial veins for chest wall
- Self-limiting condition
- Sx: palpable cord or mass usually associated with pain

- Image findings
  - US: superficially located long, tubular, anechoic structure with a beaded appearance
  - No flow on color or spectral Doppler study

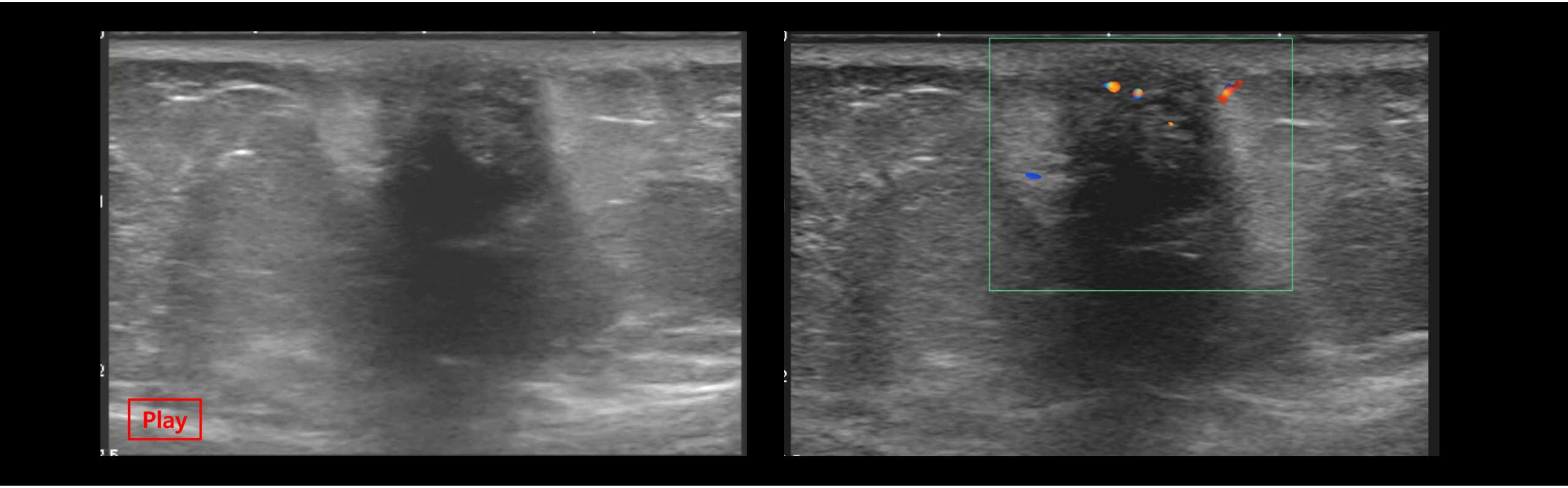


References (AJR Am J Roentgenol . 2001 Oct;177(4):893-6.)

Question 15

Question 15 (Musculoskeletal, Difficulty: Medium)

Q. 26/F, hard mass at upper arm lateral side

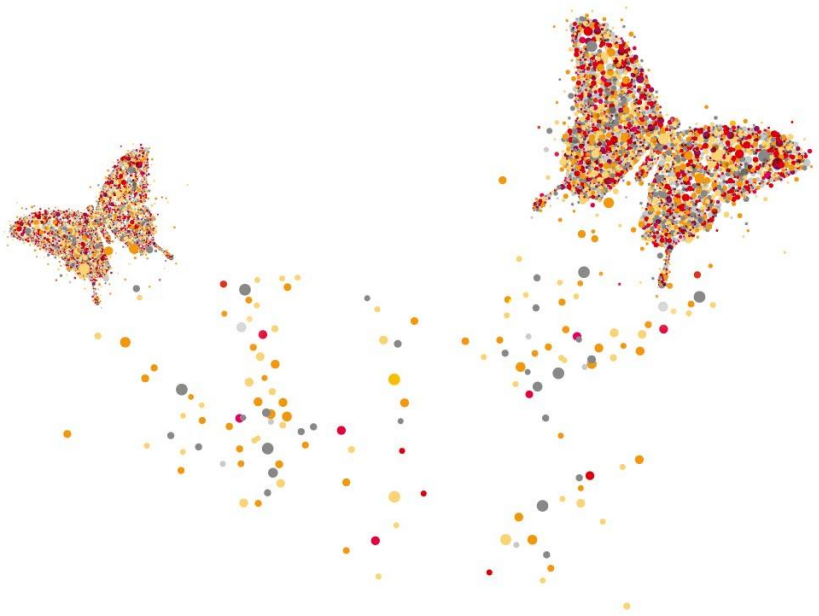


① Pilomatricoma

② Epidermal cyst

③ Nodular fasciitis

④ Vascular leiomyoma



What is the Correct Answer?

① **Pilomatricoma**

② **Epidermal cyst**

③ **Nodular fasciitis**

④ **Vascular leiomyoma**

References
Ji Young Hwang, Sun Wha Lee, Sang Min Lee, The Common Ultrasonographic Features of Pilomatricoma. J Ultrasound Med. 2005;24:1397-1402.

① Pilomatricoma (Calcifying Epithelioma of Malherbe)

- a benign skin adnexal tumor originating from hair follicle matrix cells. It is one of the most common subcutaneous tumors in children and young adults.

Clinical Hallmark: Typically presents as a stony hard, mobile, and painless subcutaneous nodule frequently found in the head, neck, and upper extremities.

Key Sonographic Findings

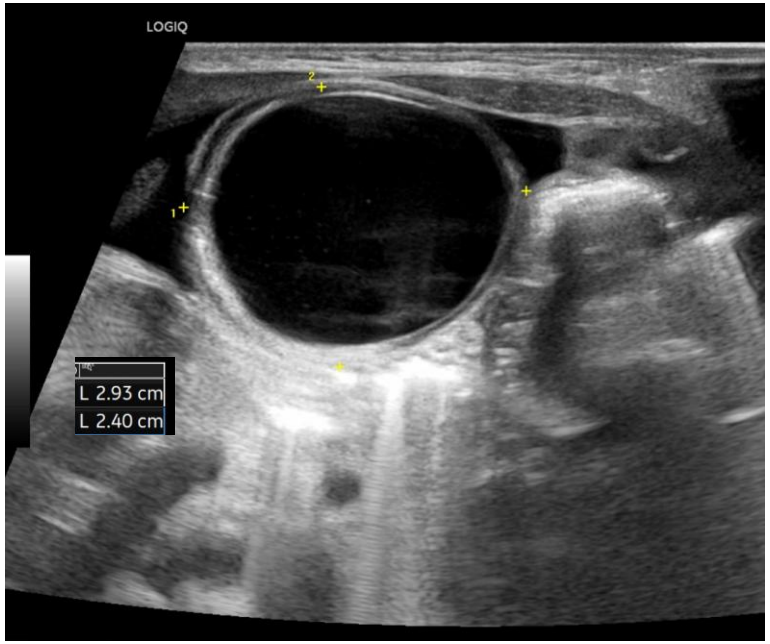
- "Target" or "Halo" Appearance: A classic sign consisting of a central hyperechoic area (keratinization and calcification) surrounded by a peripheral hypoechoic rim (representing the connective tissue capsule or inflammatory response).
- Internal Calcifications: Present in approximately 80% of cases. These can range from fine punctate granules to dense, clumped calcific arcs.
- Acoustic Shadowing & Twinkling: Strong internal calcifications often cause posterior acoustic shadowing. On Color Doppler, the twinkling artifact is a common and helpful clue for identifying these calcified regions.
- Vascularity: Often shows some degree of internal or peripheral vascularity on Doppler, which helps differentiate it from a simple epidermal cyst.

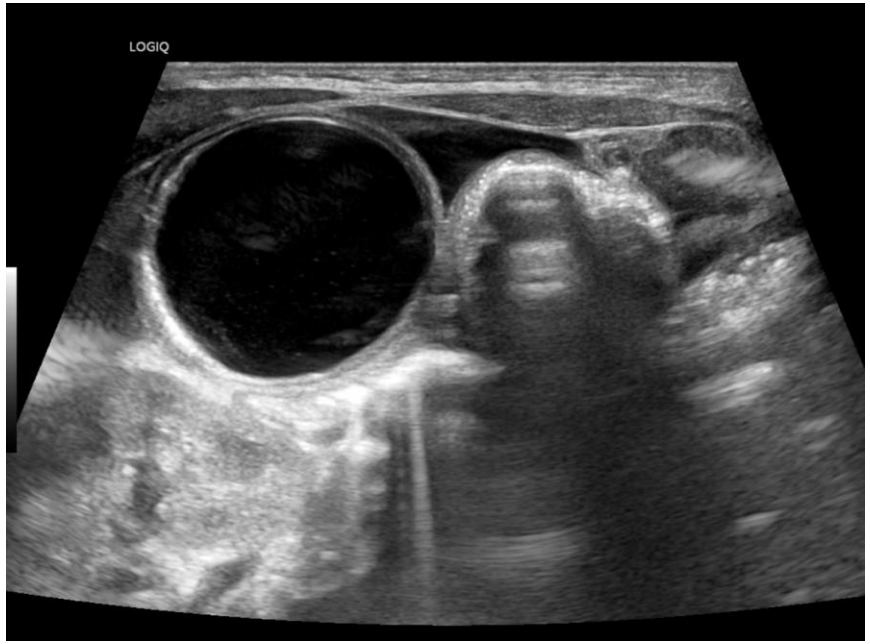
References
Ji Young Hwang, Sun Wha Lee, Sang Min Lee, The Common Ultrasonographic Features of Pilomatricoma. J Ultrasound Med. 2005;24:1397-1402.

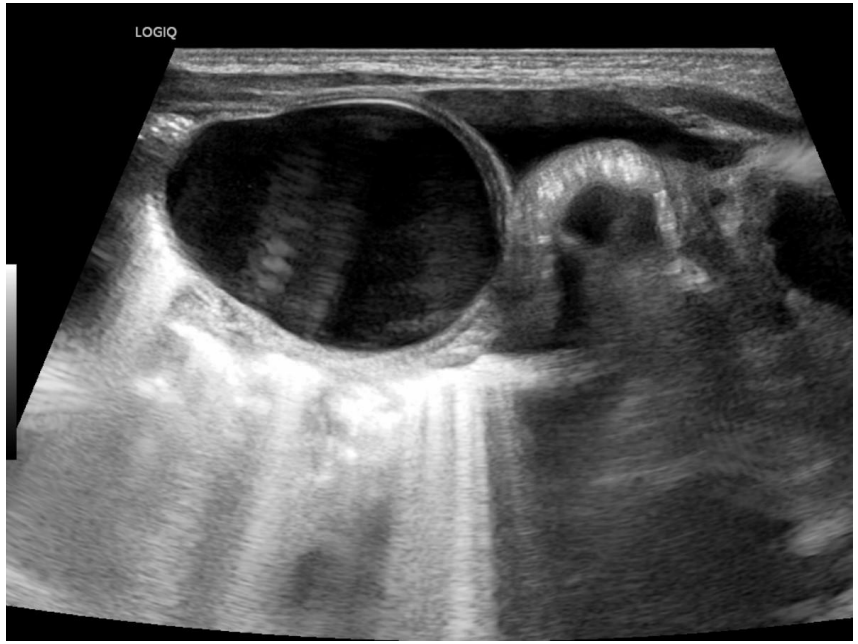
Question 16

Question 16 (Pediatric, Difficulty: Medium)

Q. 1 Day/F, Abdominal cyst was detected on prenatal ultrasound.





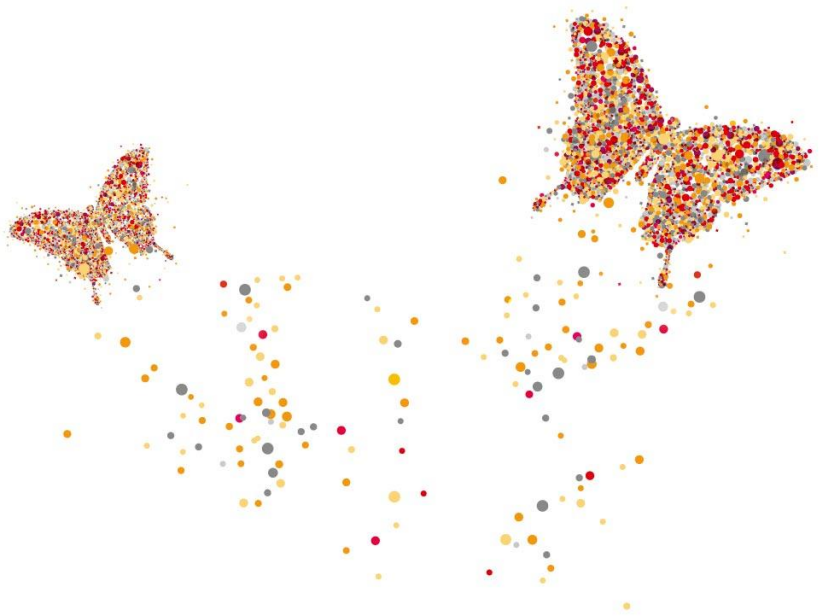


① Cystic teratoma

② Intestinal duplication cyst

③ Ovarian cyst

④ Meckel's diverticulum



What is the Correct Answer?

① Cystic teratoma

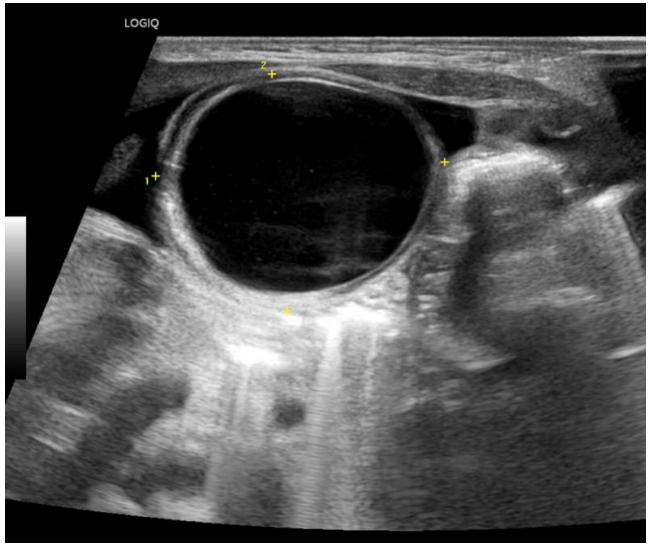
② Intestinal duplication cyst

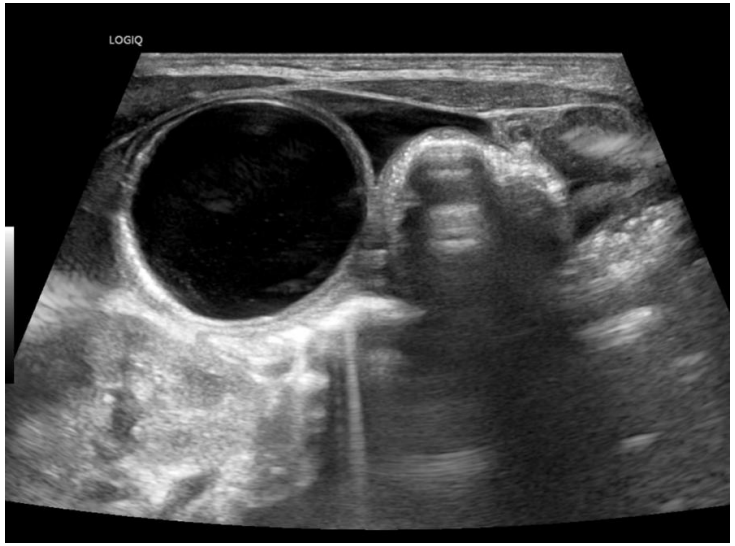
③ Ovarian cyst

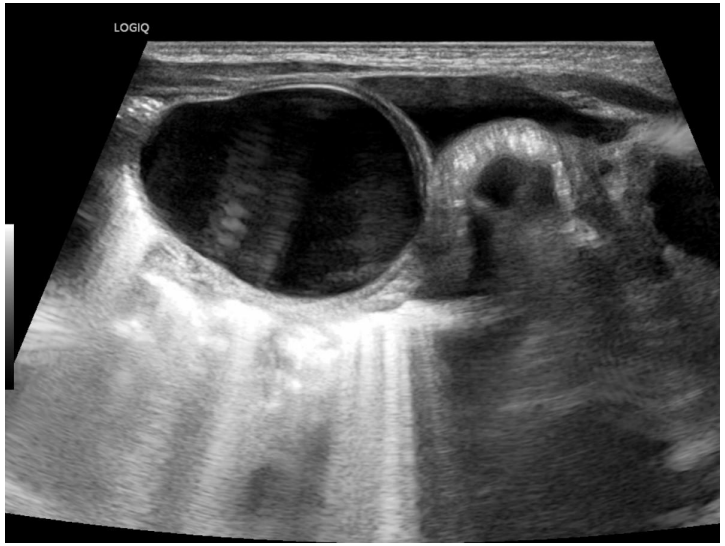
④ Meckel's diverticulum

② Intestinal duplication cyst

- The classic "gut signature" (or double-wall sign) on ultrasound
  : alternating hyperechoic (inner) and hypoechoic (outer) layers,





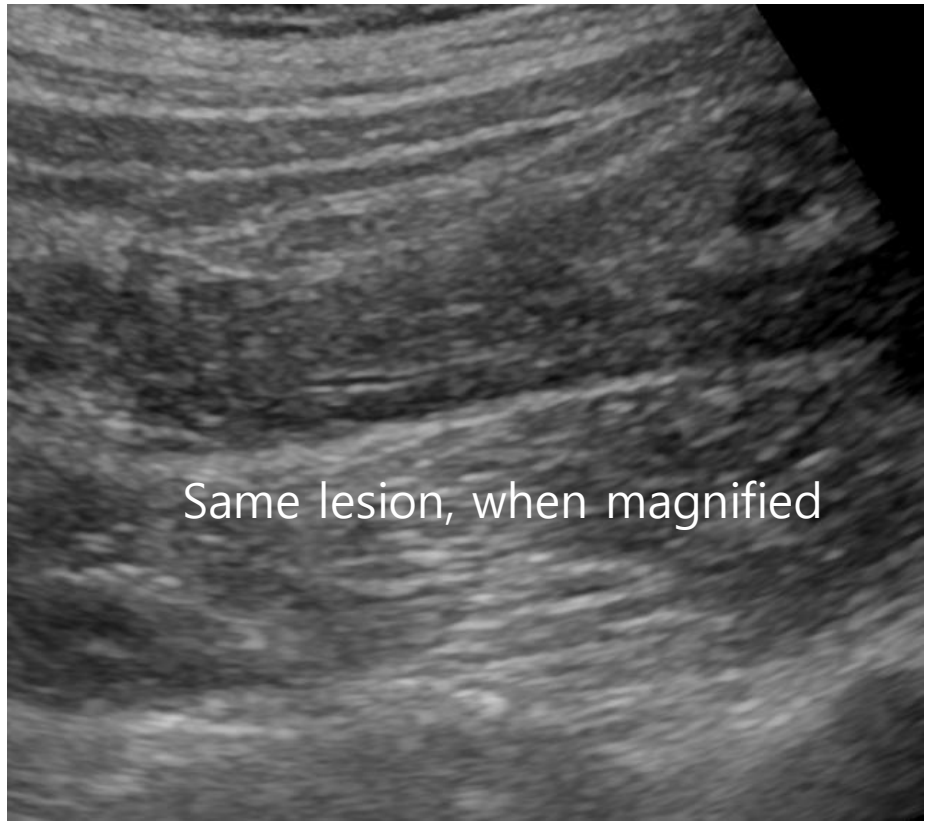


References (J Ultrasound. 2015 Nov 23;19(2):131–133.)

Question 17

Question 17 (Abdomen, Difficulty: Medium)

Q. A 35-year-old female patient had elongated soft tissue lesion at the anterior aspect of the psoas muscle. What is the diagnosis?



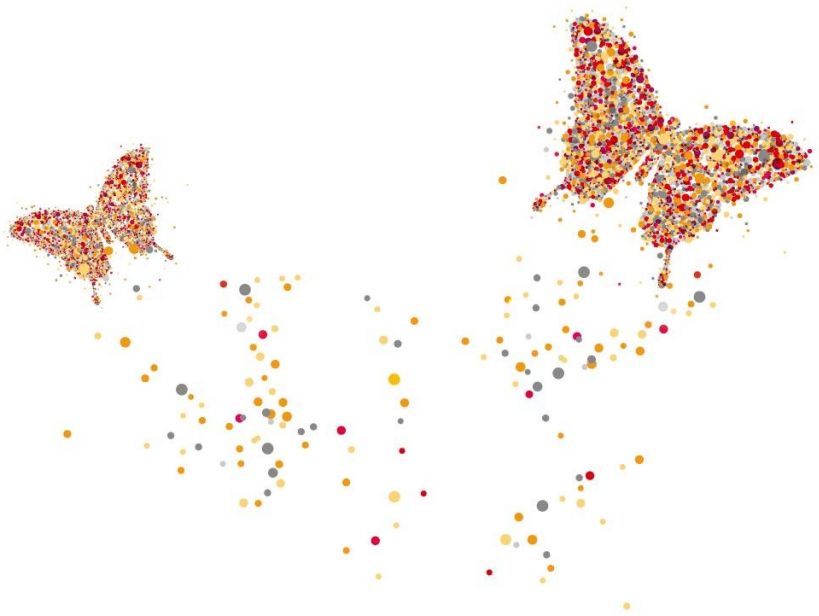
① Desmoid type fibromatosis

② Lymphoma

③ IgG4-related disease

④ Transplanted organ

⑤ Right adnexa tumor



What is the Correct Answer?

① Desmoid type fibromatosis

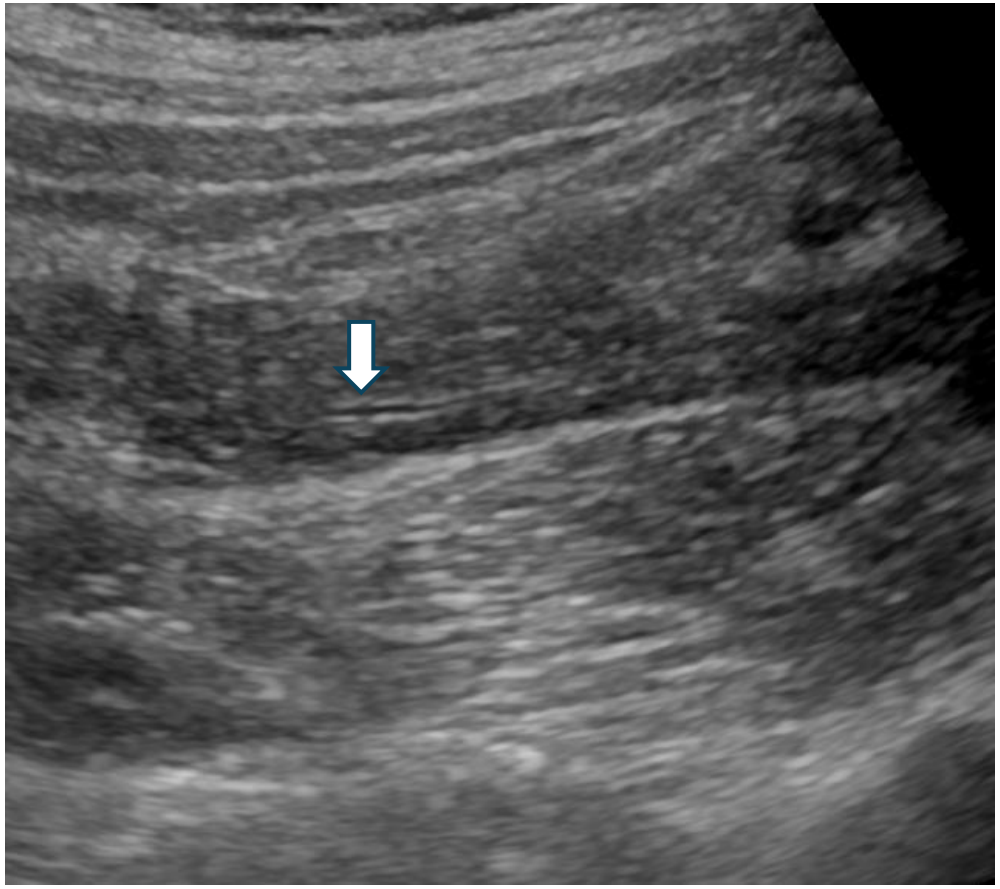
② Lymphoma

③ IgG4-related disease

④ Transplanted organ

⑤ Right adnexa tumor

④ Transplanted pancreas

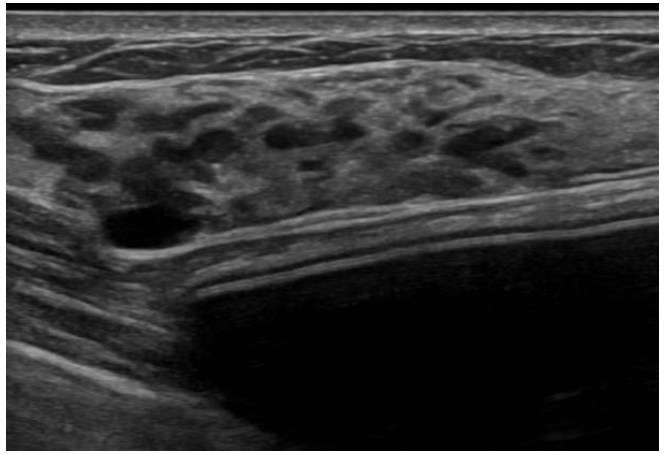


Question 18

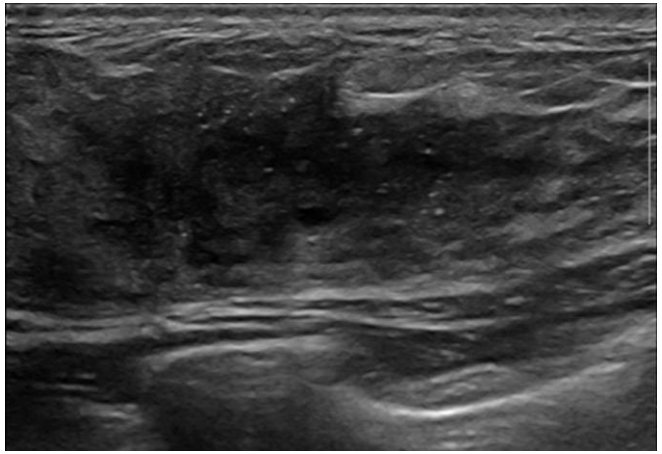
Question 18 (Breast, Difficulty: High)

Q. Which of the following findings has the highest likelihood of cancer?

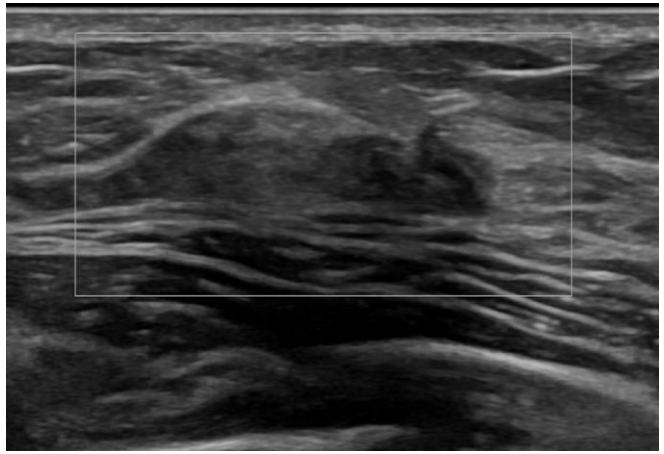
①



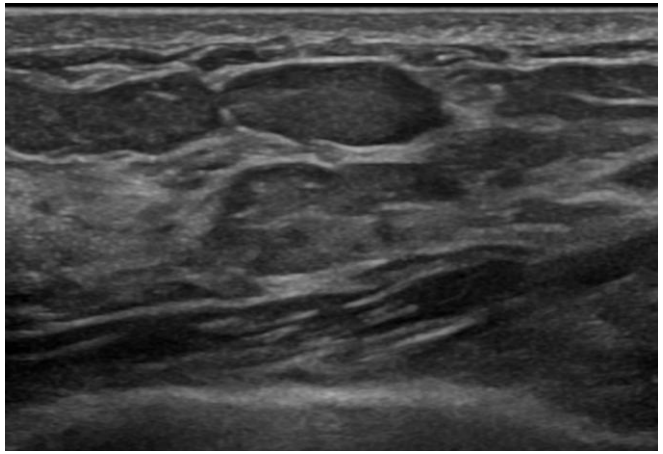
②

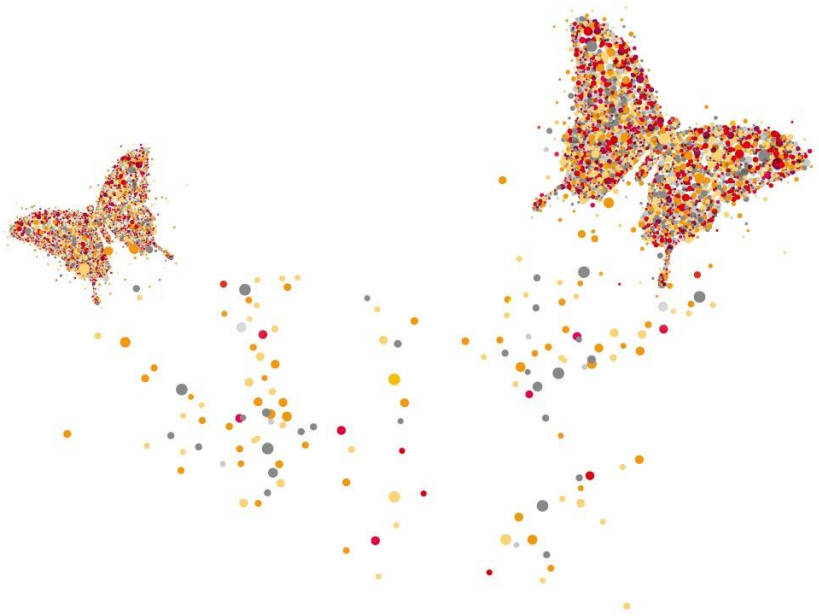


③



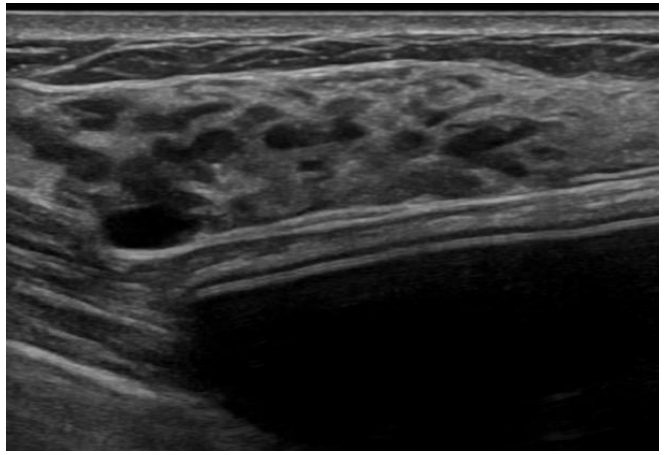
④





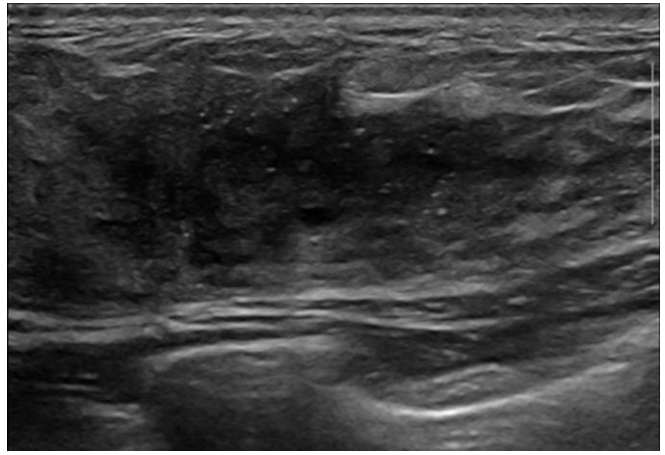
What is the Correct Answer?

①



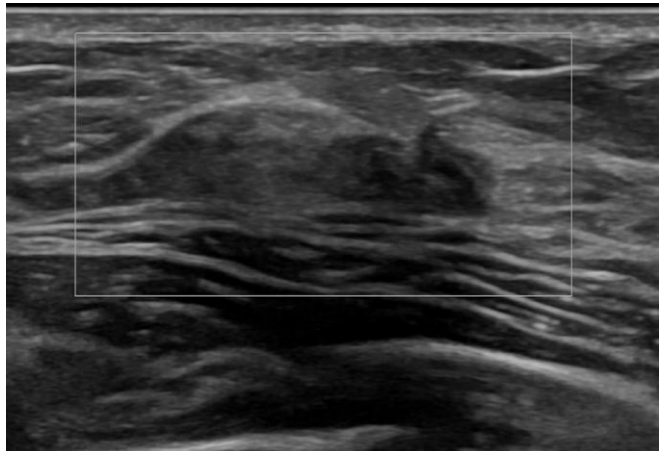
Hypoechoic non-mass lesion associated with small cysts

②



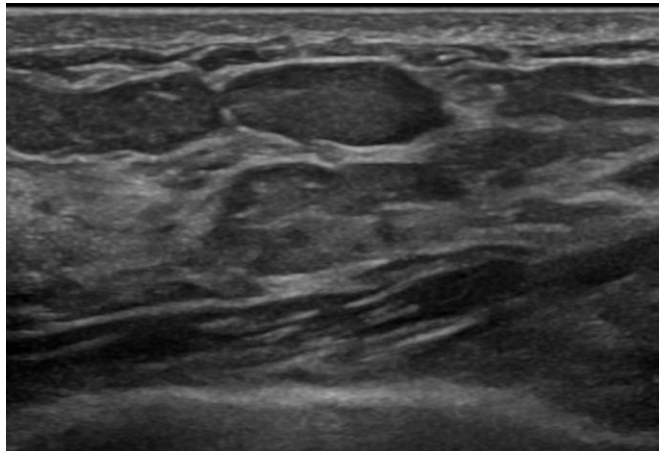
Segmental hypoechoic non-mass lesion with calcifications

③



Hypoechoic non-mass lesion without vascularity

④



Benign fat lobule

② Segmental hypoechoic non-mass lesion with calcifications

- Non-mass lesion
  - Seen in 3 dimensions but lacks discrete margination of mass and cannot be assigned a specific shape
  - Associated findings being predictive of malignancy
    - Architectural distortion
    - Posterior shadowing
    - Hypervascularity
    - Ductal extension or abnormal duct change
    - Calcifications

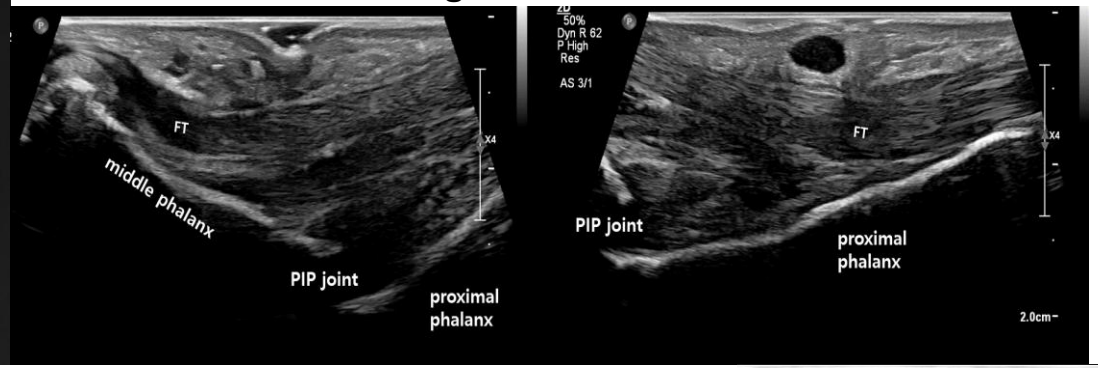
References (BI-RADS v2025 Manual 350-351)

Question 19

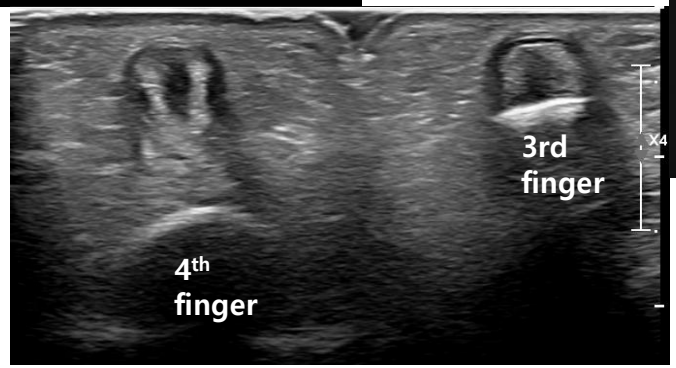
Question 19 (Musculoskeletal, Difficulty: High)

Q. A 72-year-old man presented with flexion contracture (FC) of the 4th finger. What is the cause of the FC?

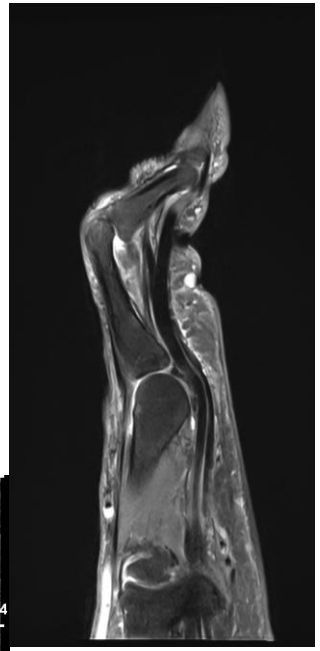
Longitudinal US scan



FT = 4th flexor tendon



Transverse US



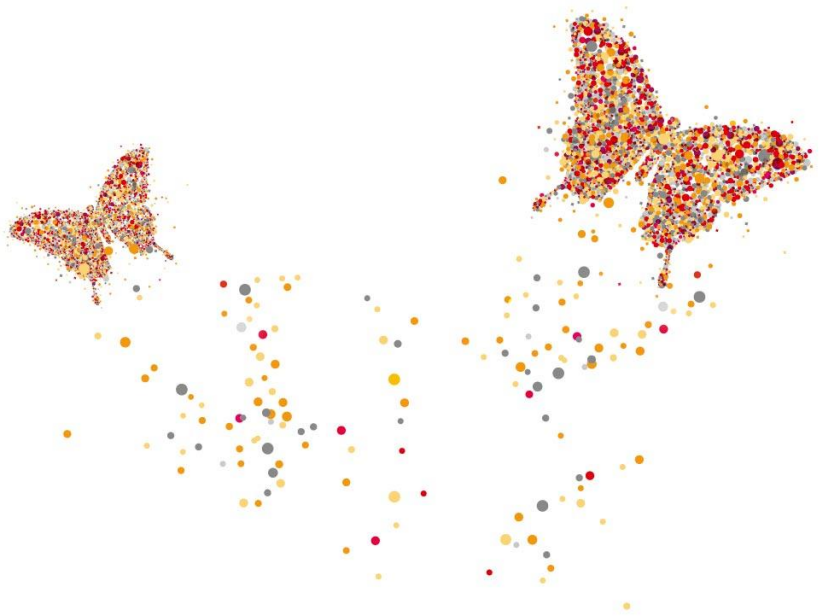
Sagittal FS T2WI of the 4th finger

① Dupuytren's contracture

② Pulley rupture

③ Trigger finger

④ Flexion tendon rupture



What is the Correct Answer?

① Dupuytren's contracture

② Pulley rupture

③ Trigger finger

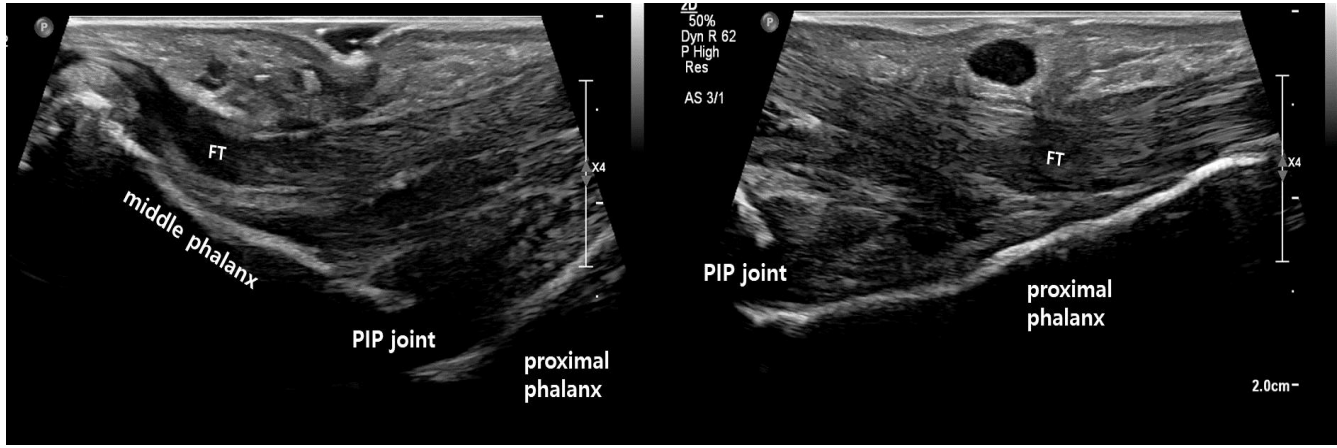
④ Flexion tendon rupture

② Flexor pulley rupture

- The flexor pulley system (A1–A5) maintains the **flexor tendon close to the phalanges** and prevents bowstringing.
- **A2 and A4 pulleys are biomechanically the most important**; rupture leads to loss of tendon constraint.
- Most commonly occurs in **forceful finger flexion against resistance**, especially in **rock climbers ("climber's finger")**.
- Clinical features include **pain, swelling, and loss of grip strength**, sometimes with a palpable bowstringing tendon.
- **Imaging (US/MRI)** demonstrates **bowstringing of the flexor tendon with increased tendon–bone distance** and pulley discontinuity or thickening.

Digital Flexor Pulley Anatomy

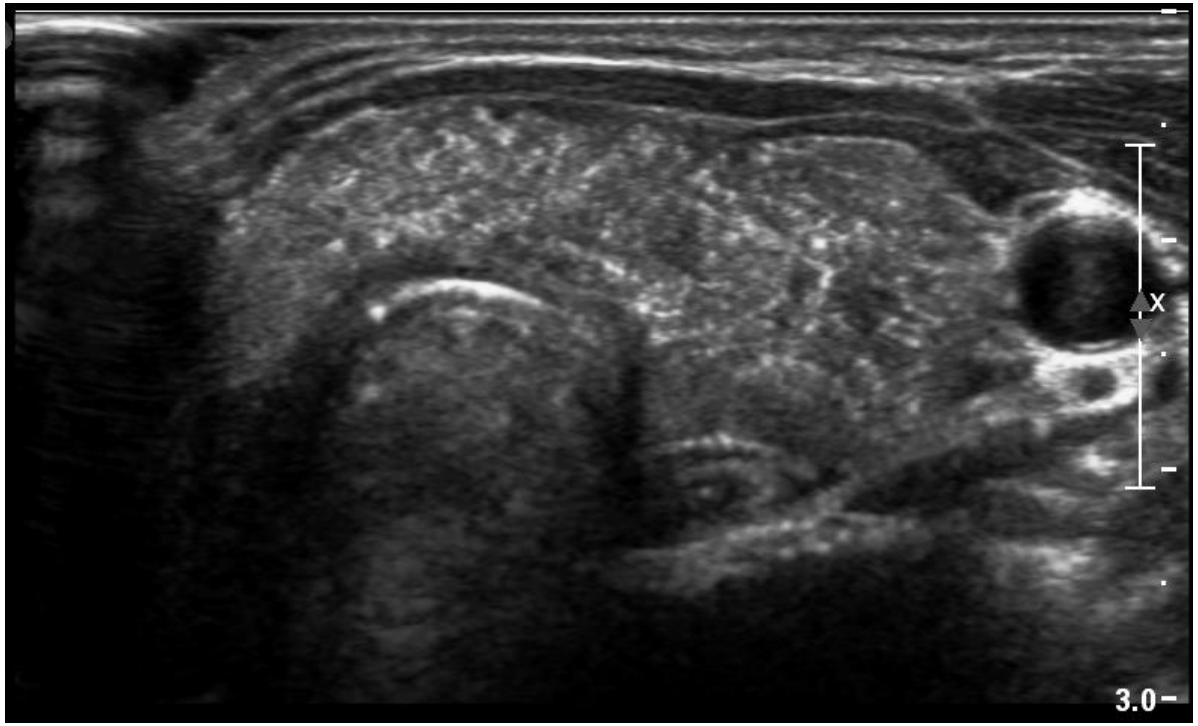
- **5 annular pulleys (A1–A5) + 3 cruciate pulleys (C1–C3)**.
  - **A1:** MCP joint level
  - **A2:** proximal phalanx (strongest pulley)
  - **A3:** PIP joint level
  - **A4:** middle phalanx (biomechanically important)
  - **A5:** DIP joint level

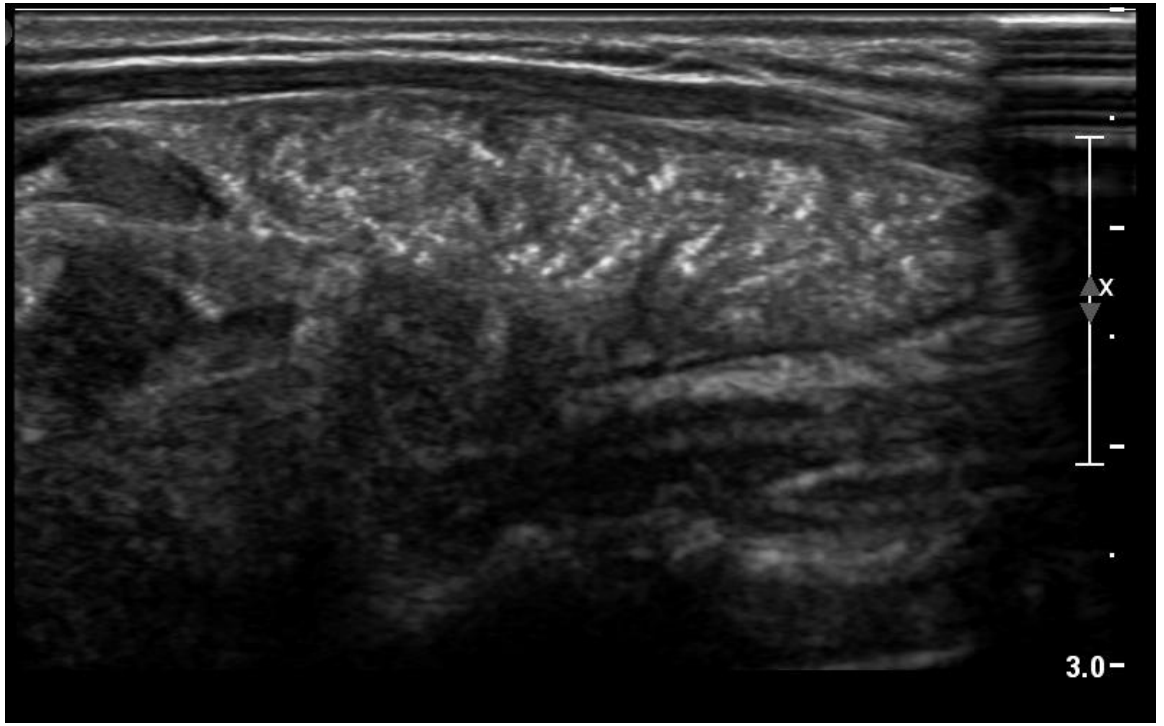


Question 20

Question 20 (Thyroid, Difficulty: Low)

Q. A 43-year-old woman. Abnormal finding on screening thyroid US. What is your diagnosis?



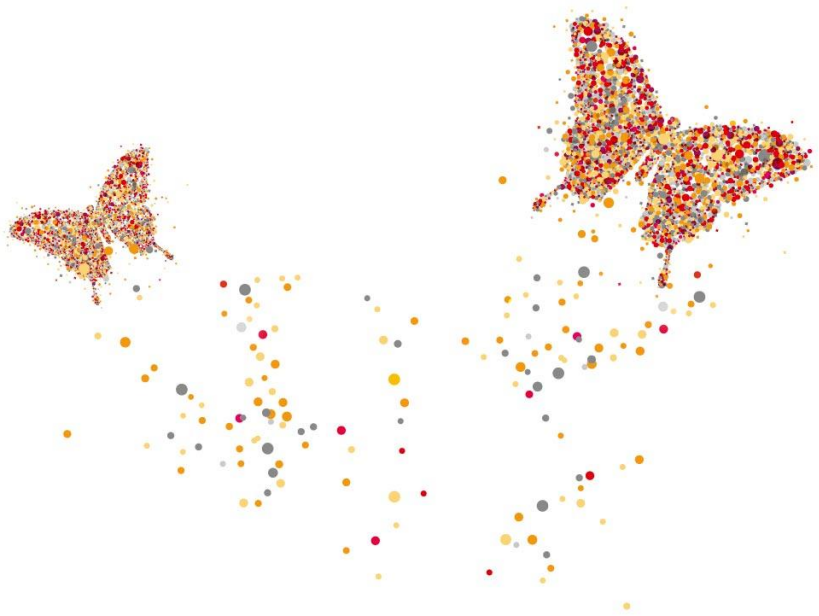


① Hashimoto thyroiditis

② Thyroid lymphoma

③ Diffuse sclerosing variant papillary thyroid carcinoma

④ Medullary thyroid carcinoma



What is the Correct Answer?

① Hashimoto thyroiditis

② Thyroid lymphoma

③ Diffuse sclerosing variant papillary thyroid carcinoma

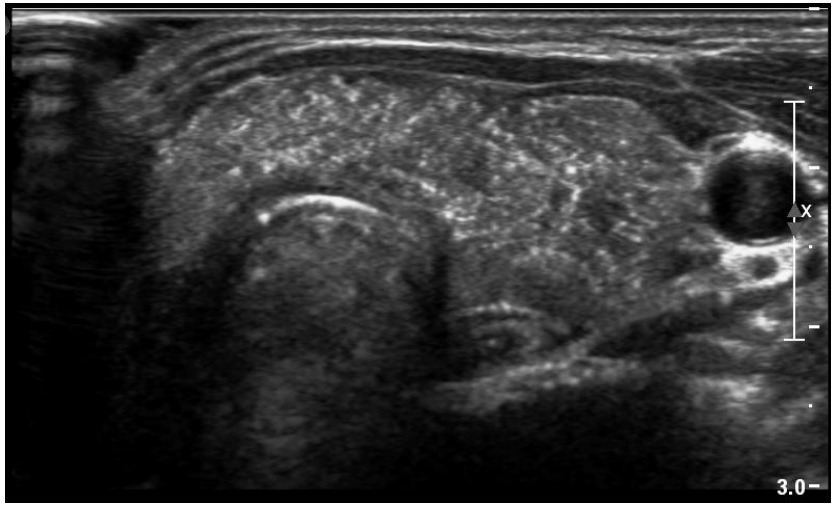
④ Medullary thyroid carcinoma

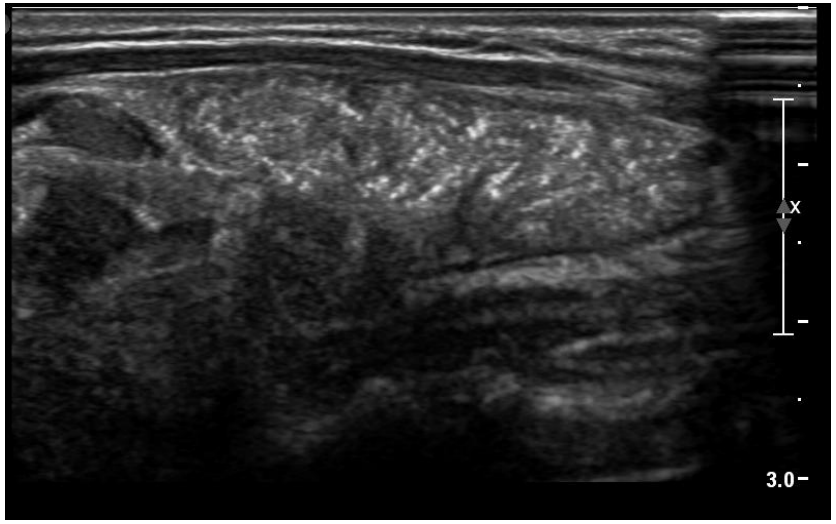
③ Diffuse Sclerosing Variant PTC

- Rare subtype of PTC (1–3%)
- Often occurs in children and young adults
- Can be mistaken for thyroiditis

- Frequent lymph node metastasis
- Higher recurrence rate than classic PTC
  - However, overall survival is generally good

- **Diffuse scattered punctate echogenic foci ("snowstorm appearance"),** with or without a discrete dominant mass
  → suspect diffuse sclerosing variant PTC !





Question 21

Question 21 (Physics, Difficulty: High)

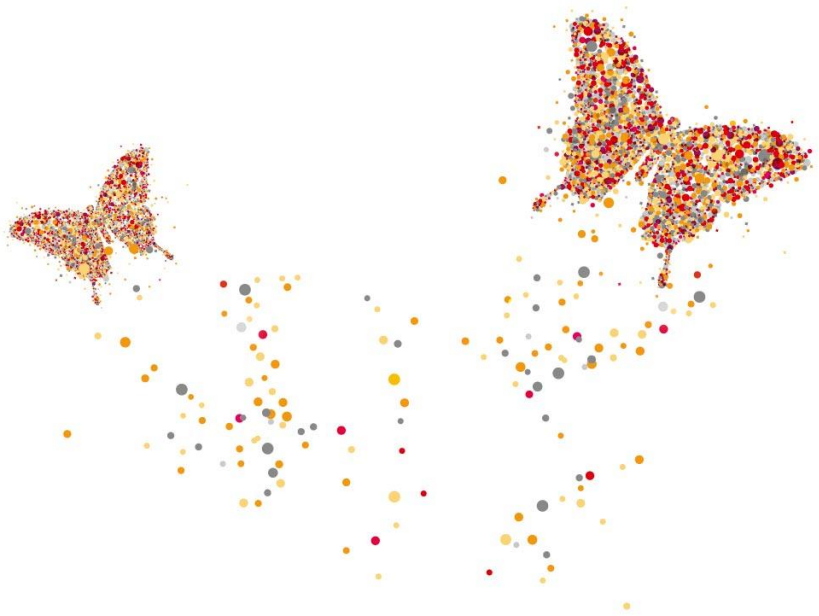
Q. What is the correct statement for the red signal that a white arrow indicates?

① The signal is from arterial blood flow.

② The blood at the point is moving away from the transducer.

③ The key signal processing method for the colorized image is auto-correlation.

④ The key signal processing method for the colorized image is cross-correlation.



What is the Correct Answer?

① The signal is from arterial blood flow.

② The blood at the point is moving away from the transducer.

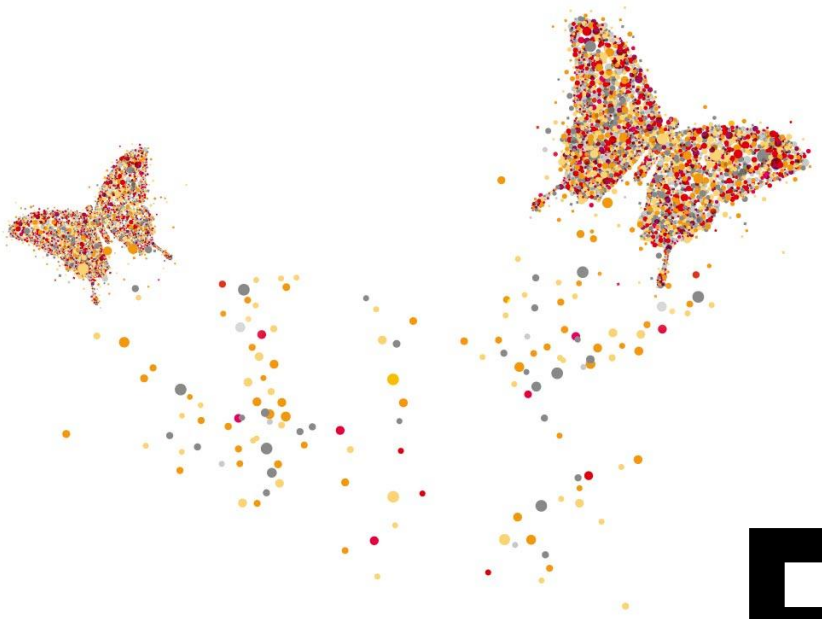
③ The key signal processing method for the colorized image is auto-correlation.

④ The key signal processing method for the colorized image is cross-correlation.

③ The key signal processing method for the colorized image is auto-correlation.

- Color Doppler imaging provides a directional flow-speed map using the BART convention (**blue away, red toward**) superimposed on B-mode vessel images.
- The brightness of each color corresponds to the magnitude of the Doppler frequency shift, and thus to higher flow velocities, although angle dependence can influence this relationship.
- This real-time 2D technique relies on **autocorrelation** in the time and spatial domains rather than on frequency-domain Doppler spectral analysis, enabling **rapid processing**.
- While color Doppler displays flow velocity qualitatively through color brightness, it does not yield fully quantitative velocity measurements.
  - Quantification is generally performed using PW Doppler spectrograms in duplex imaging.

References *Ultrasonography 2025;44:409-424*



Round 2

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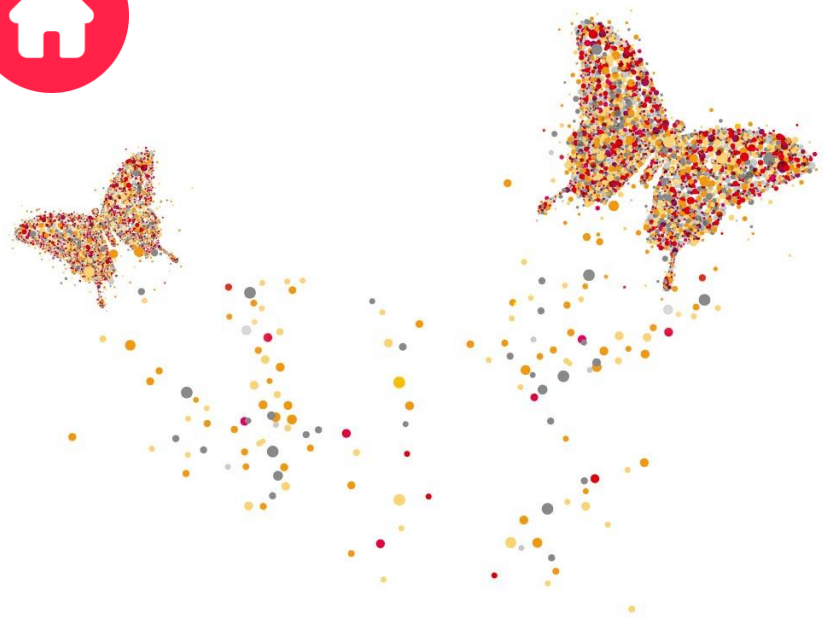
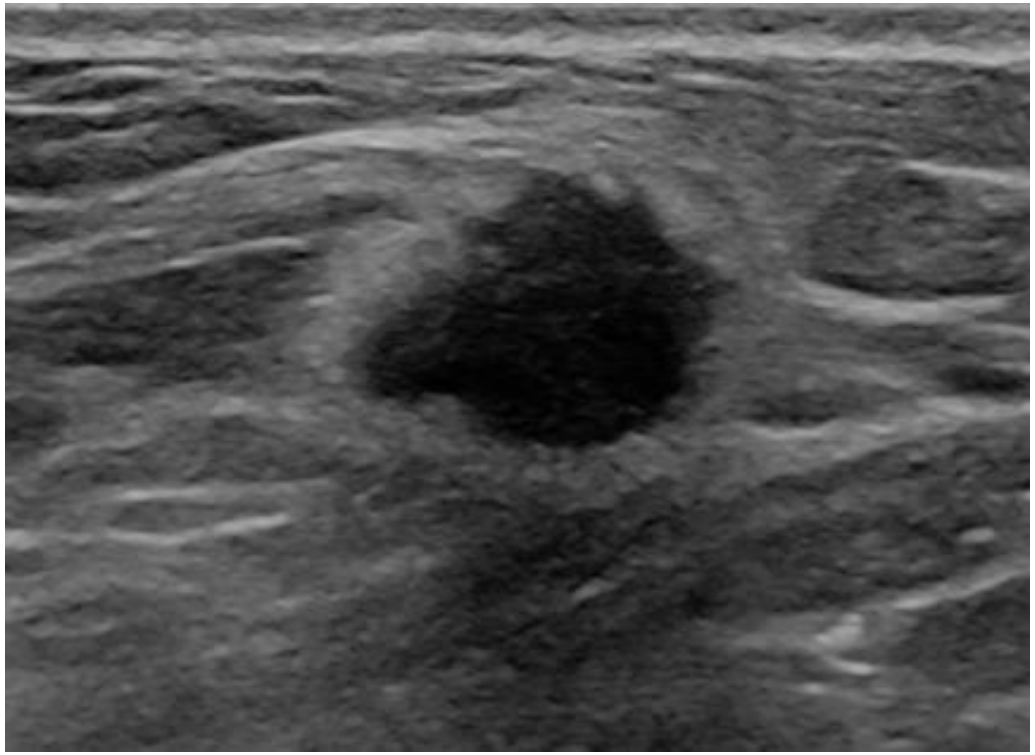
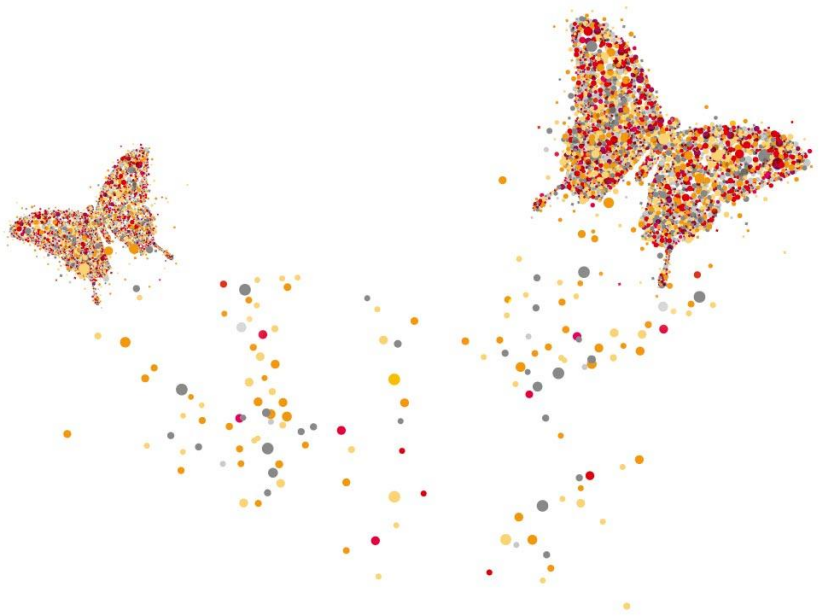


Breast

Question

Q. An orange image and a breast ultrasound image are shown.
What descriptive term describes this sonographic appearance?





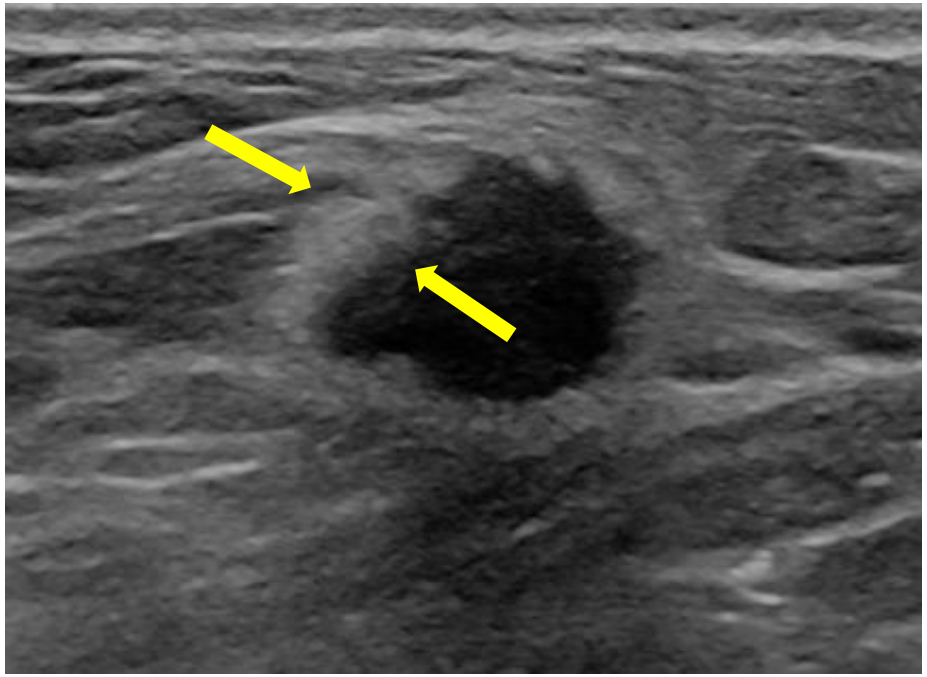
What is the Correct Answer?

Answer

Echogenic Rind

Echogenic Rind

- Echogenic rind as a new descriptor in the 6th edition of the BI-RADS Atlas
- An associated feature characterized by a thick echogenic band partially or completely surrounding a breast mass
- Suggests malignancy
- Inclusion of echogenic rind in the measurement of mass correlates with pathology



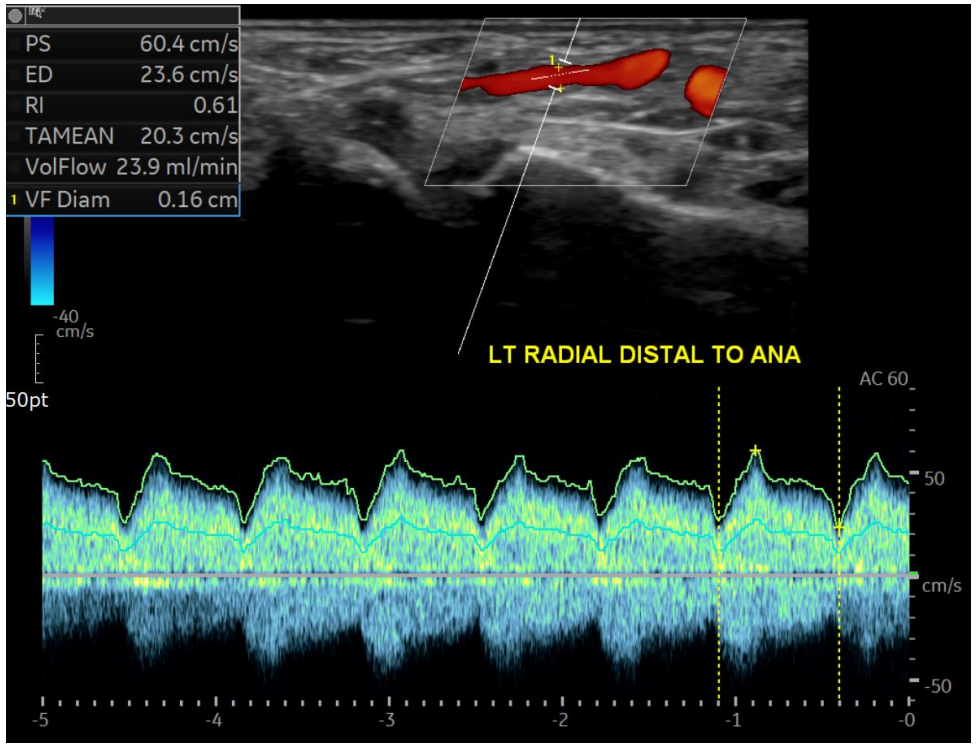
Invasive Ductal Carcinoma

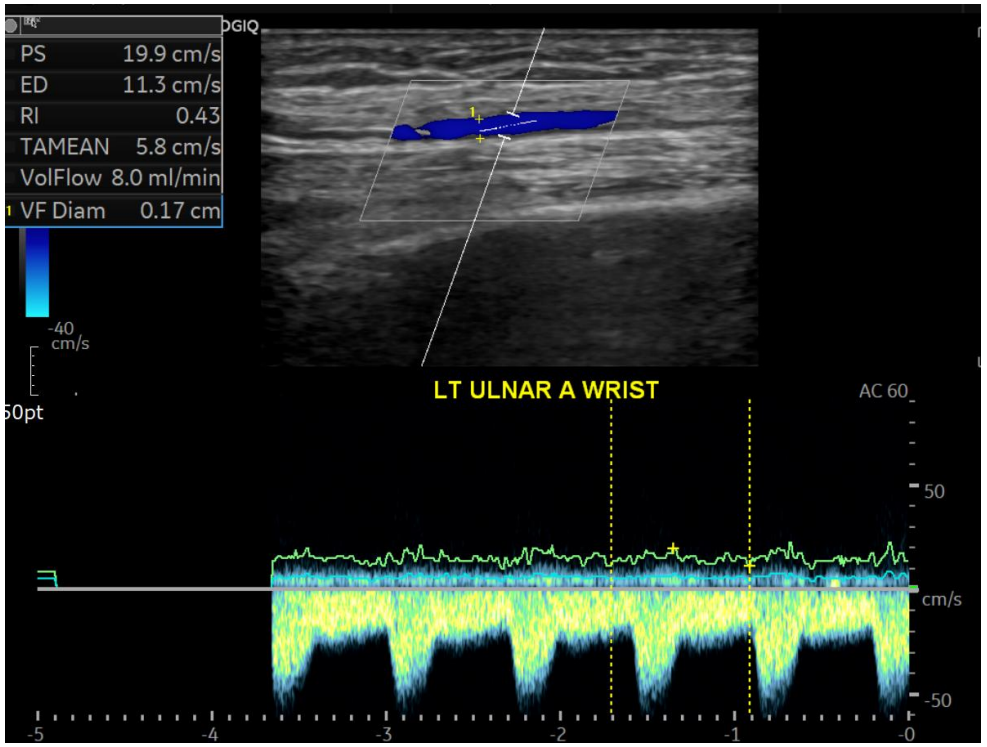
References
Leung JWT, Baker JA, Hooley R, et al. Ultrasound. In: ACR BI-RADS v2025 Manual. Reston, VA: American College of Radiology, 2025; 225-226

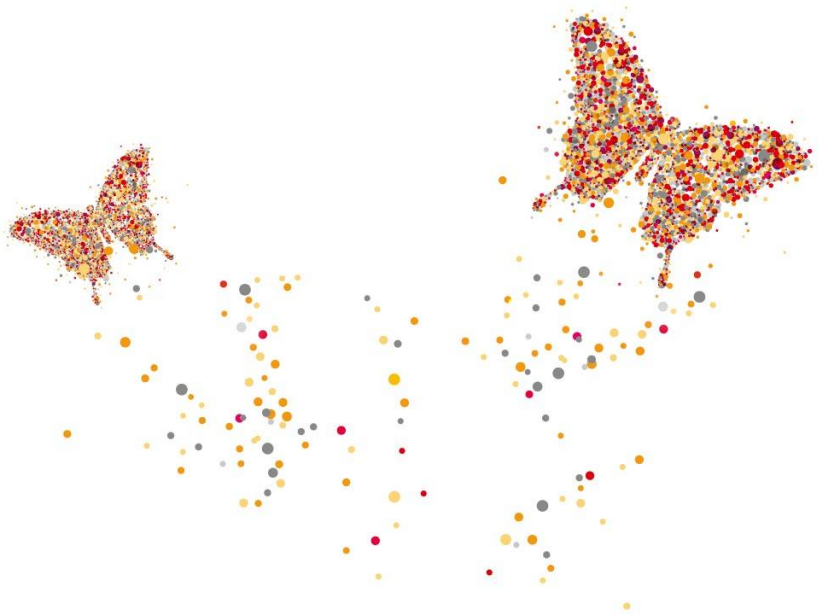
Cardiovascular

Question

Q. A 74-year-old woman on hemodialysis presents with numbness and pain at the fingertips of her left hand. The following vascular ultrasound findings were obtained. What is the most likely diagnosis?







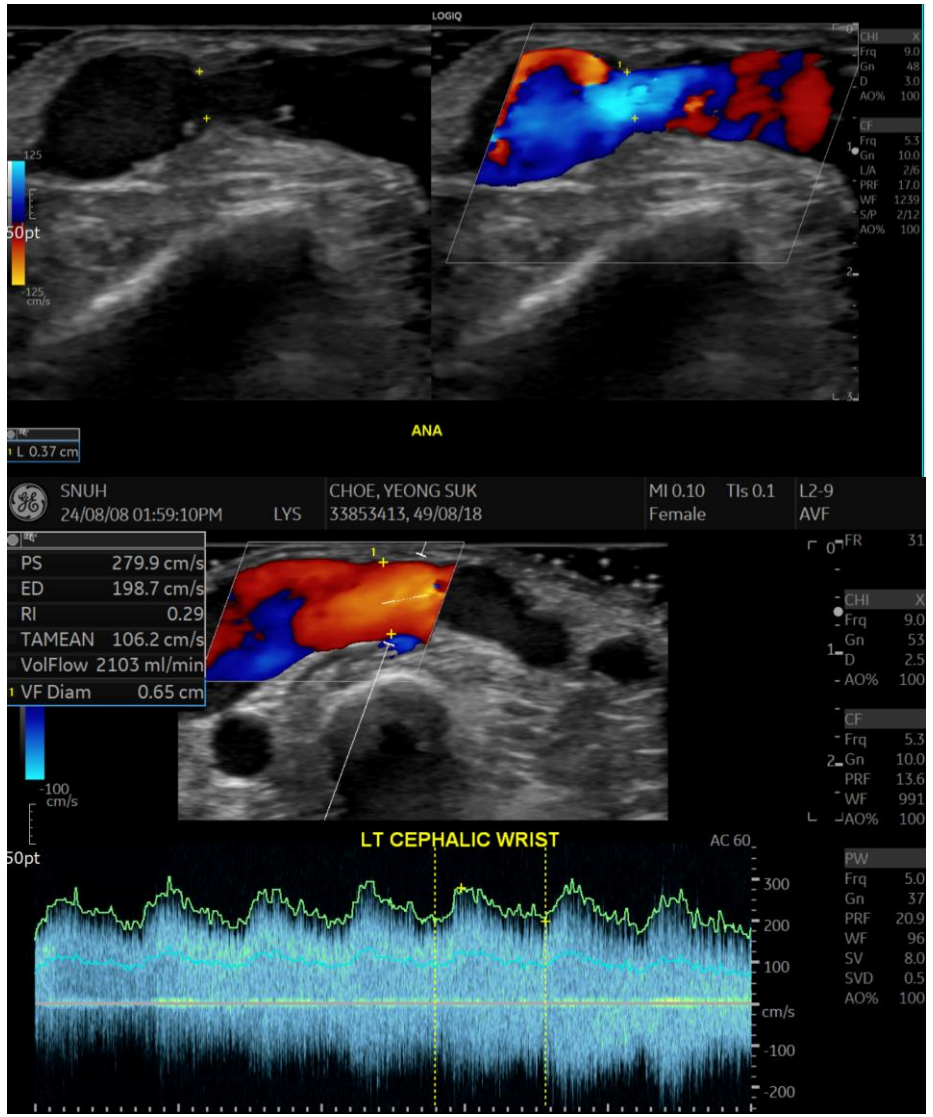
What is the Correct Answer?

Answer

Dialysis access-associated steal syndrome

- **Dialysis Access-Associated Steal Syndrome (DASS)** is an uncommon but potentially limb-threatening complication of high-flow arteriovenous fistulas (AVFs) in hemodialysis patients.
- **Key ultrasound clue: Reversal of flow direction in the distal radial and ulnar arteries** (distal to the anastomosis).

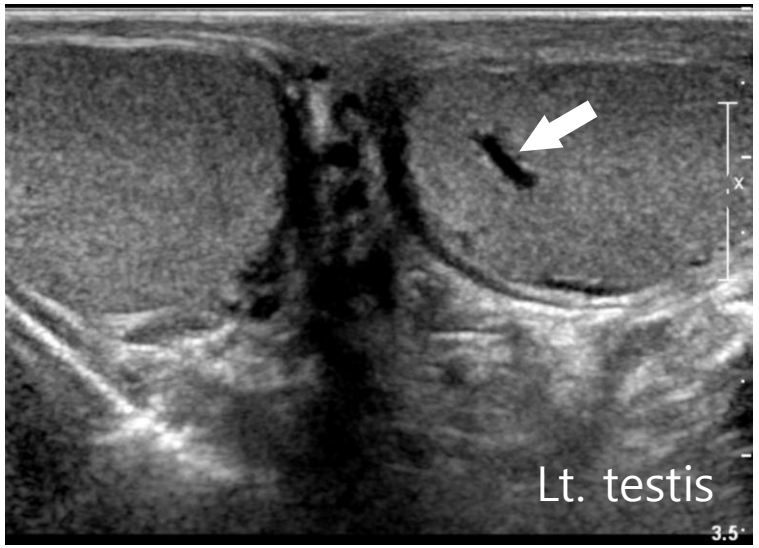
- When distal forearm/hand arteries show **retrograde flow toward the access**, it indicates that the **arteriovenous access is "stealing" blood** from the distal circulation.
- **Clinical correlation:**
  Symptoms such as **fingertip pain, numbness, coldness, or discoloration** in the access limb are consistent with **distal ischemia** from steal.

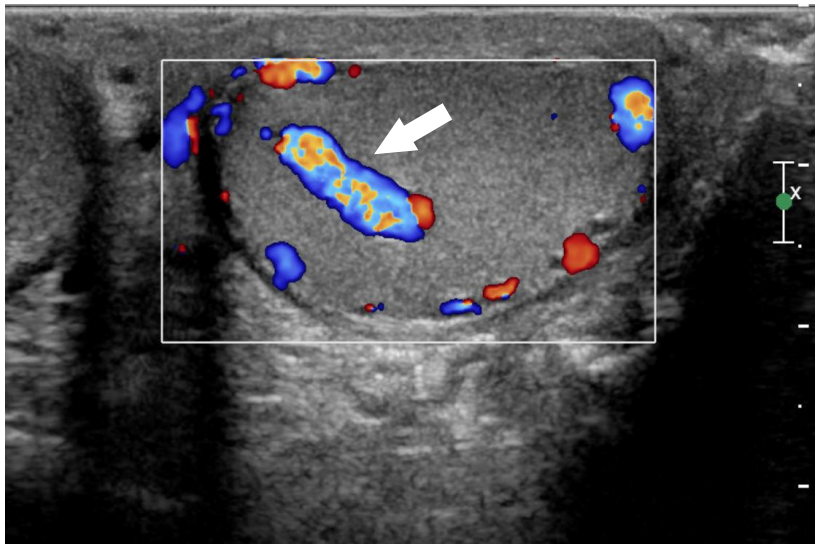


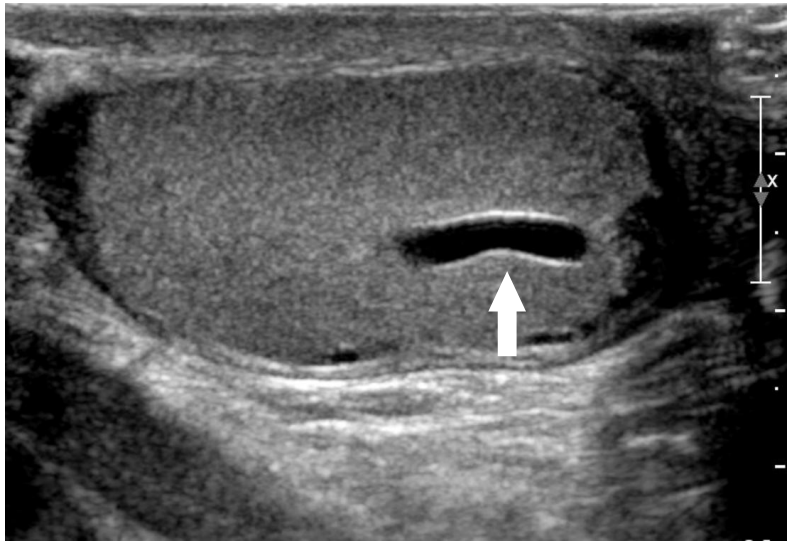
Genitourinary

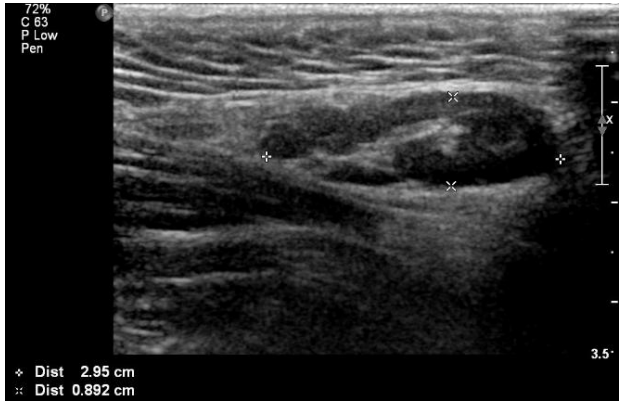
Question

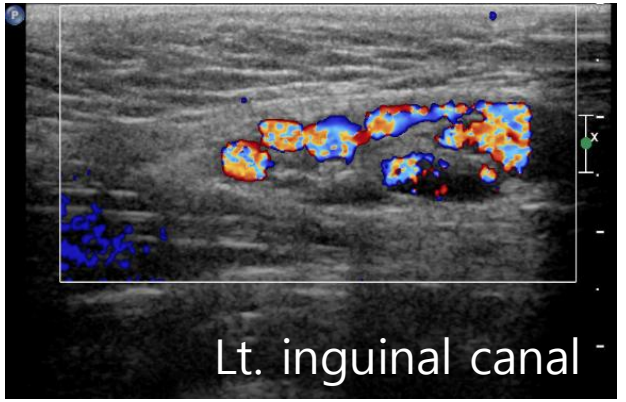
Q. A 19-year-old male with left scrotal discomfort. What is your diagnosis?

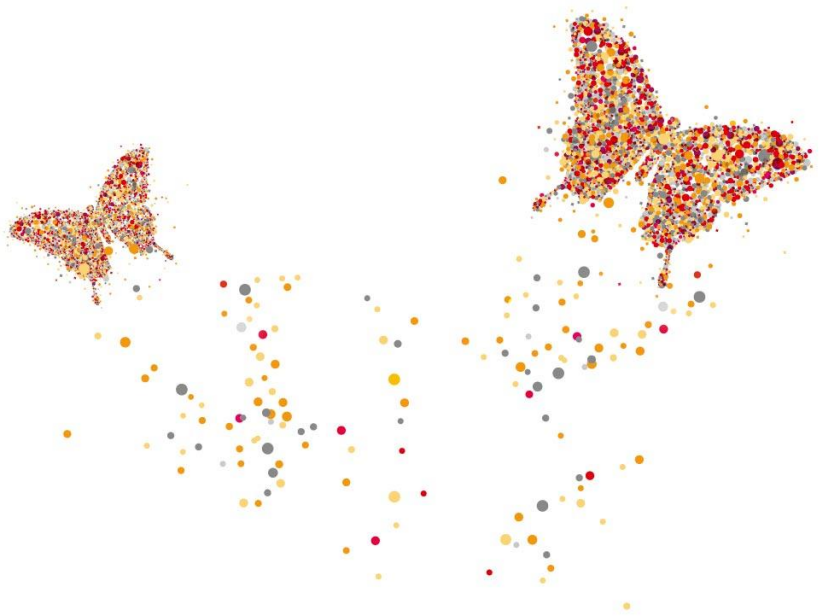








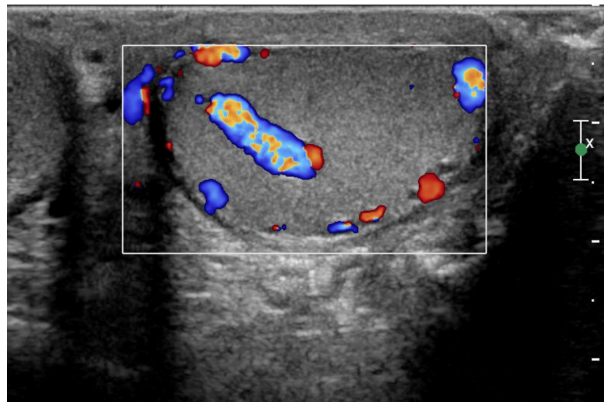


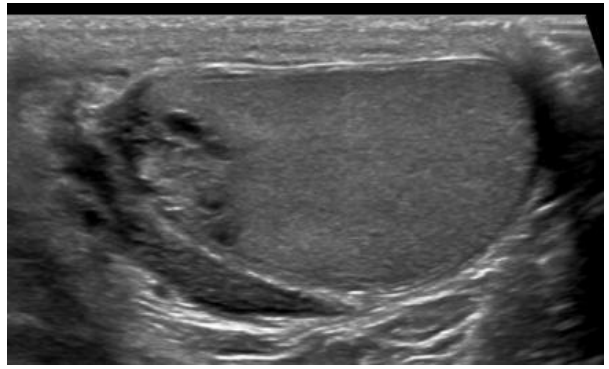


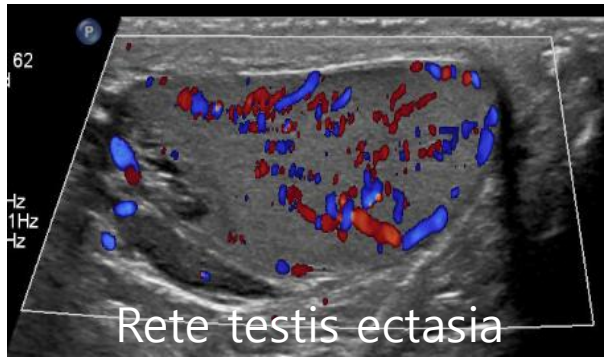
What is the Correct Answer?

Answer

Intratesticular Varicocele







Intratesticular Varicocele

- Incidence: 0.05% to 1.7% in patients with testicular problems
- Associated with ipsilateral extratesticular varicocele
  - 33.6% of patient had isolated intratesticular varicocele
- Testicular pain was the most common clinical presentation
  - stretching of the tunica albuginea after active or passive venous congestion and dilatation of the veins
- Possibly affect spermatogenesis and male fertility

- USG
  - tubular or oval anechoic structures, usually greater than 2 mm
  - located in or around the mediastinum testis
  - venous flow on doppler with positive response to Valsalva maneuver
- DDx: Ectasia of rete testis, Testicular cyst
  - Presence of color flow is the main differentiating feature

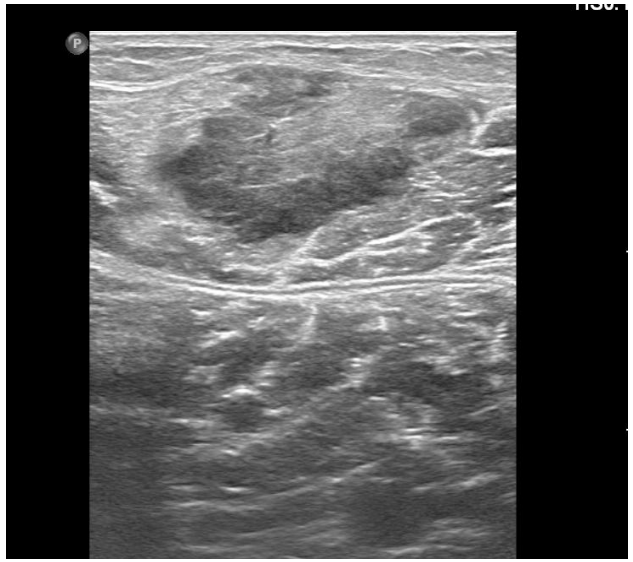
References (J Clin Ultrasound 29:369–373, 2001.
Korean J Urol 2009;50:822-824)

Musculoskeletal

Question

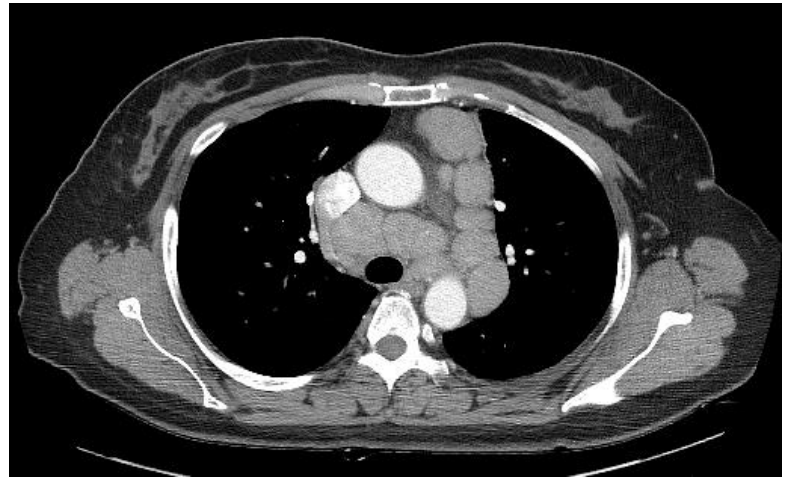
Q. A 69-year-old female patient presented with palpable masses in her calf. What is your diagnosis?

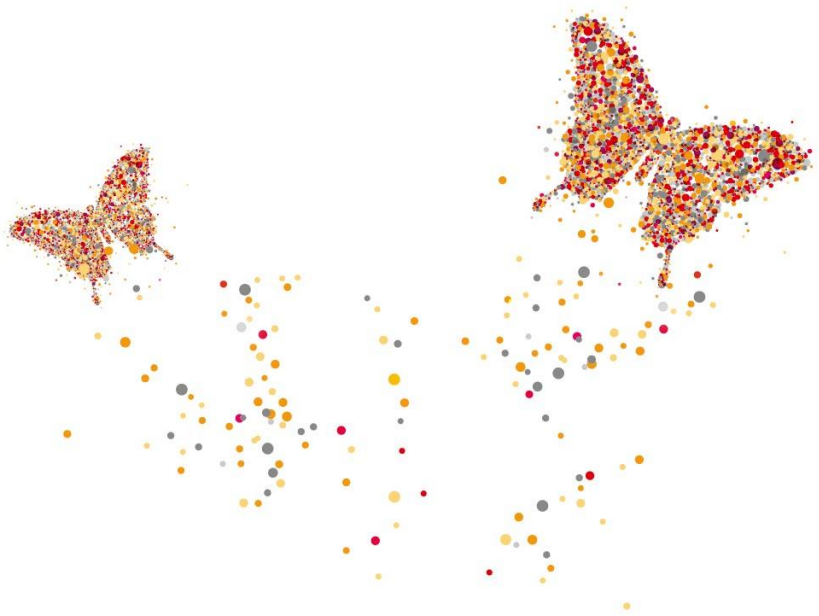
<US scan of the calf>



Transverse scan

Longitudinal scan



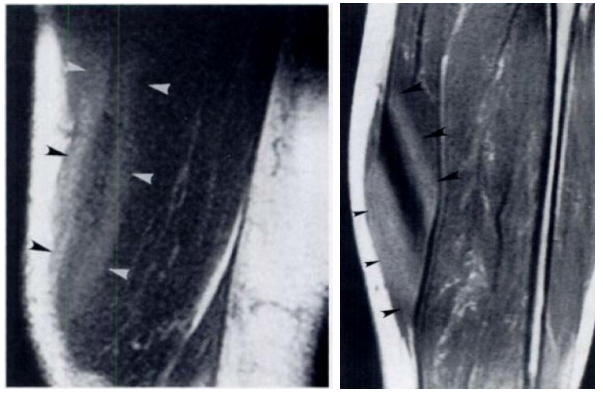


What is the Correct Answer?

Answer

Sarcoidosis

Muscular Sarcoidosis



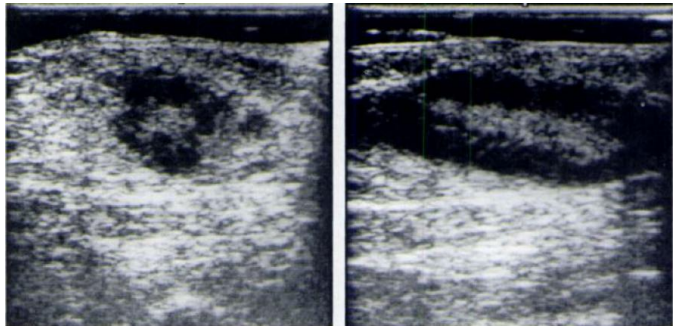
Key Sonographic Features of the nodular muscular sarcoidosis:

- **Nodular Appearance:** Presents as distinct, often multiple, hypoechoic, tumor-like masses within muscle tissue.
- **Target Sign:** Lesions often exhibit a heterogeneous pattern with a central hyperechoic area and a surrounding hypoechoic zone, resembling a target.

- **Longitudinal Orientation:** Nodules typically align with the muscle fibers.

→ Central fibrotic tissue surrounded by granulomatous inflammatory infiltration along muscle fibers produces the **target / star appearance and the longitudinal "triple-line" pattern**.

- **Vascularity:** Superb microvascular imaging (SMI) or Doppler can reveal complex, intricate vascular networks within these lesions.



Otake et al. Sarcoidosis involving skeletal muscle: imaging findings and relative value of imaging procedures. *AJR* 1994: 162(2): 255-471

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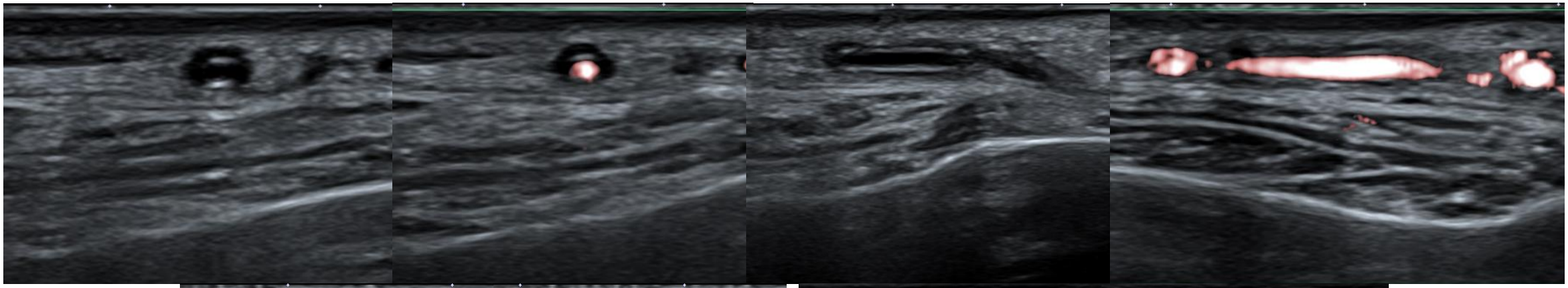
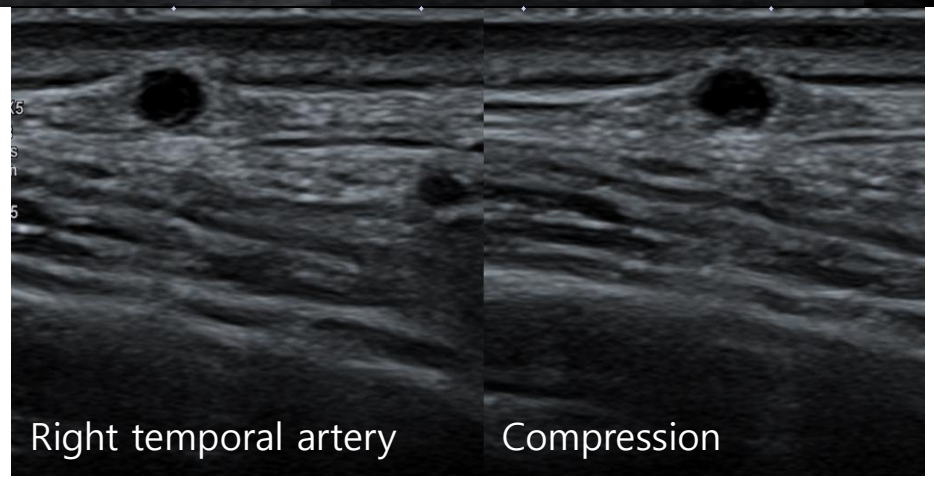
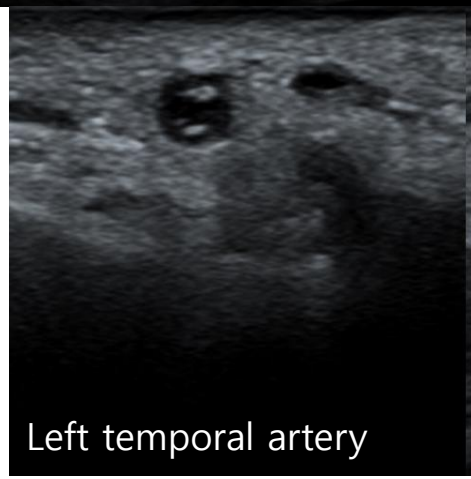
Thyroid

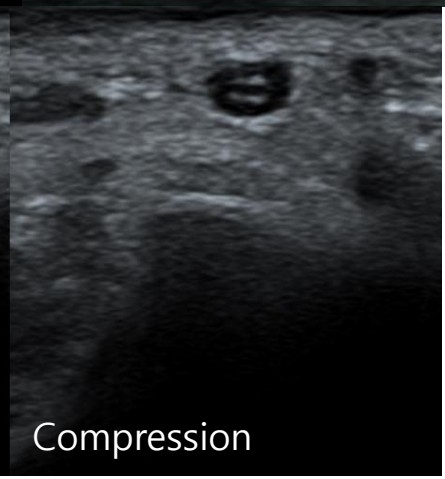
Question

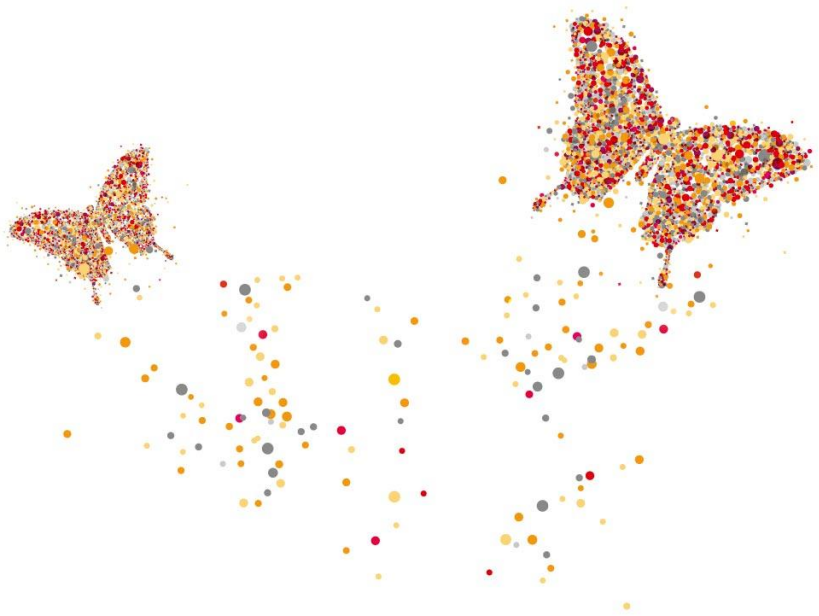
Q. A 63-year-old man presents with fever, general weakness, and temporal headache. Temporal artery ultrasound was performed. What is the most likely diagnosis?











What is the Correct Answer?

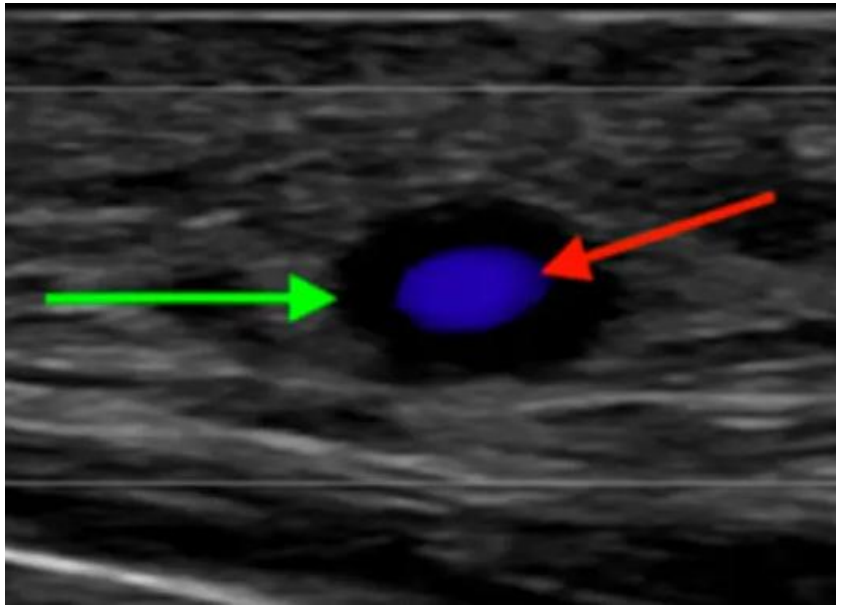
Answer

Giant cell arteritis (Temporal arteritis)

Giant Cell Arteritis

- Most common primary systemic vasculitis in adults >50 yr
- Large-vessel granulomatous vasculitis
- Mainly involves
  - superficial temporal artery
  - ophthalmic artery
  - aorta & major branches
- Clinical Sx: Temporal headache, jaw claudication, visual disturbance
- Elevated ESR / CRP
- Major Complication: Irreversible vision loss

→ requires immediate steroid treatment



- Ultrasound hallmark: Halo sign
  - Hypoechoic circumferential wall thickening
  - Represents arterial wall edema due to vasculitis
  - Non-compressible

References Ha et al. Eur Radiol (2017) 27:1186–1194
Jun et al. J VascIntervRadiol (2016) 27:1613–1617

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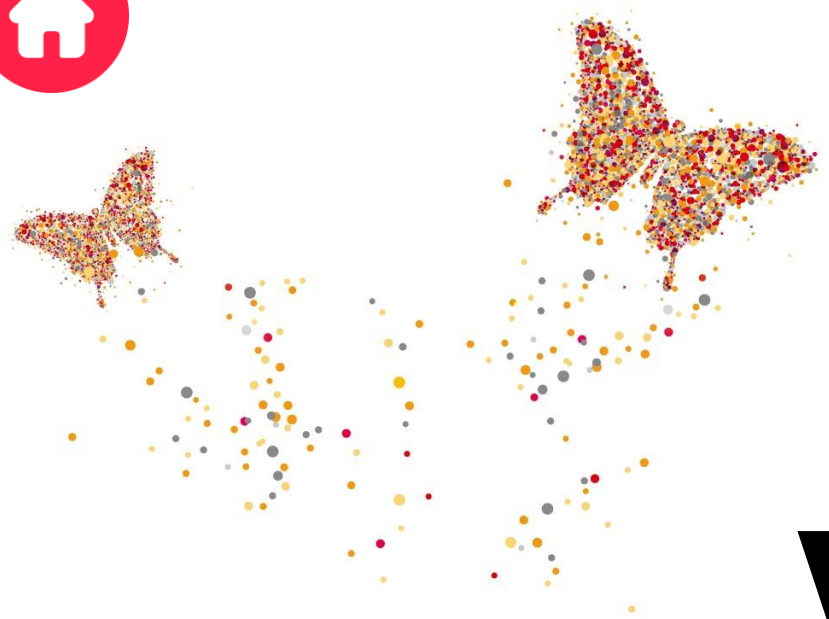
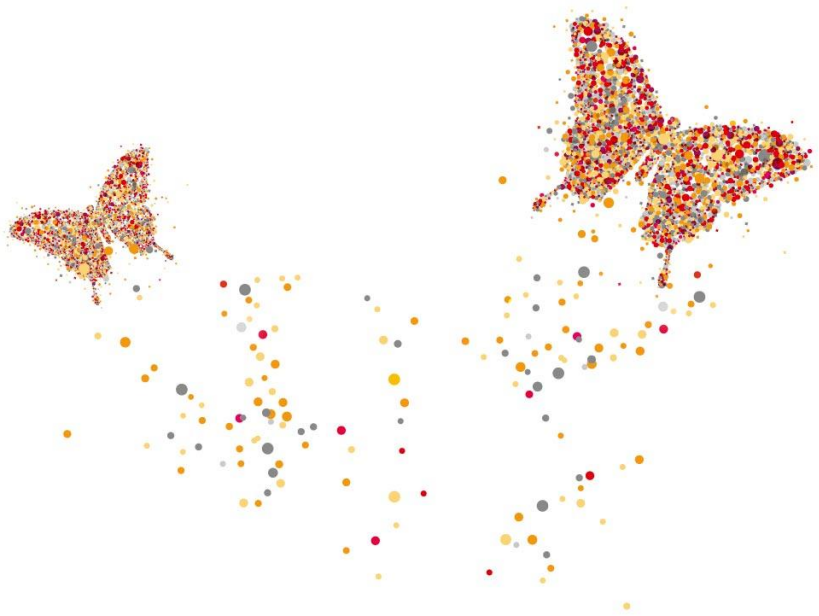


Vendor

Question

Q. There are four Gold Sponsors for KSUM 2026. Name at least two of them.



What is the Correct Answer?

Answer

Gold

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THE 57TH ANNUAL CONGRESS OF
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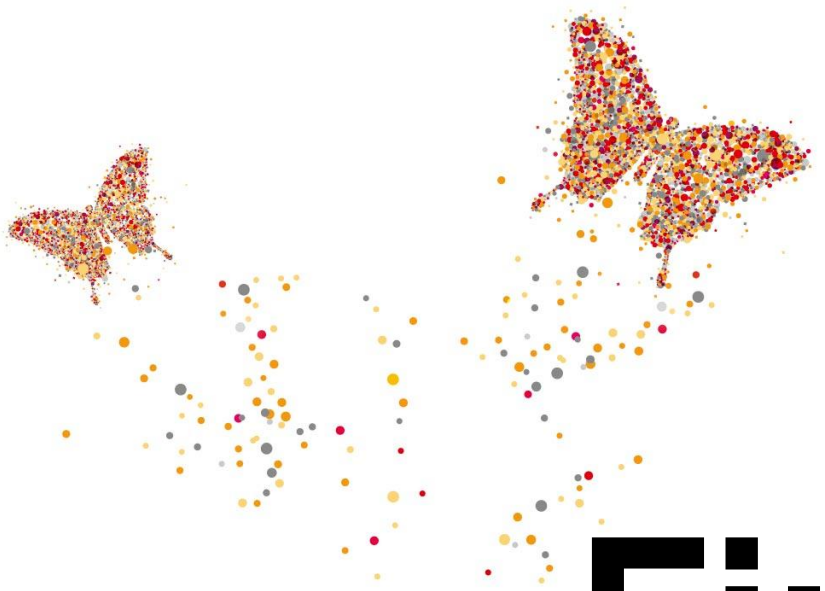
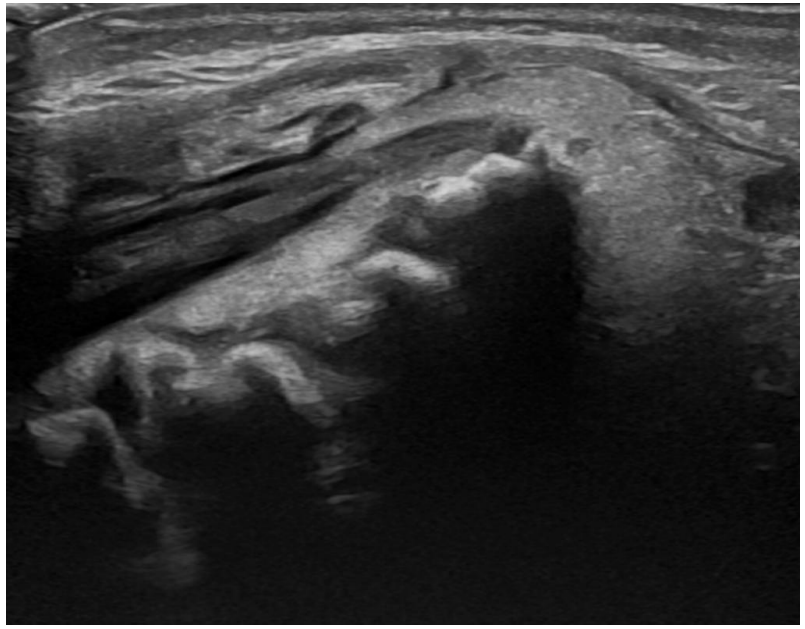
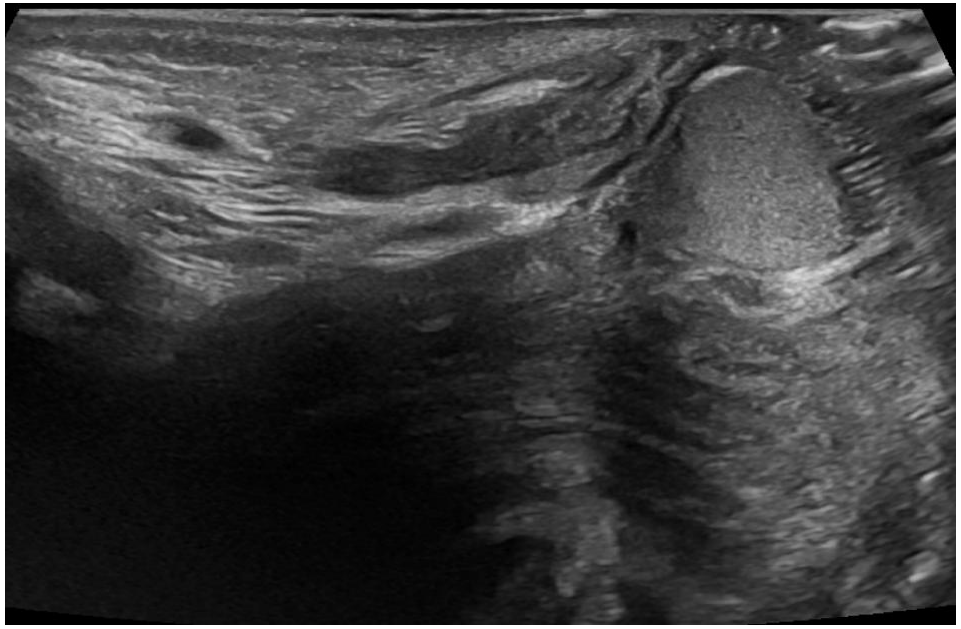


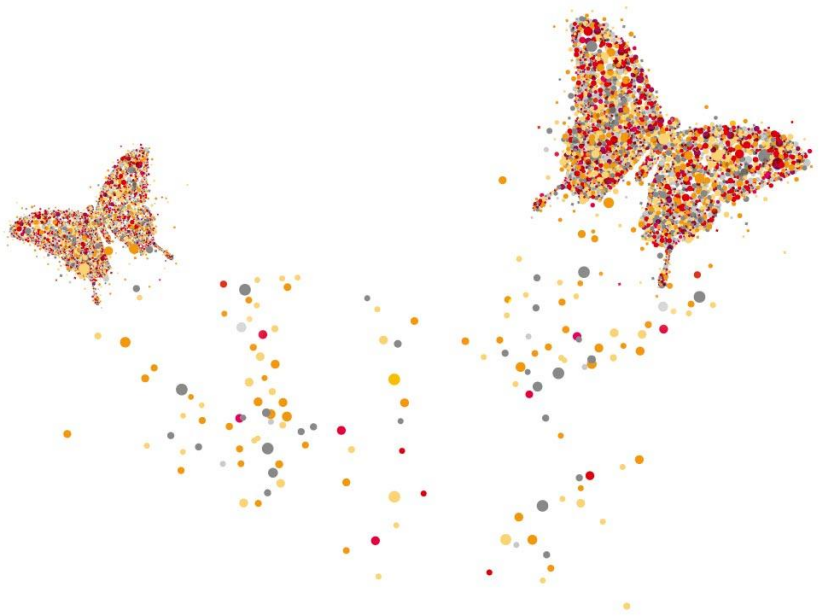
Final Round

Question

Q. 0 Year/F, Spine US and abdominal x-rays in newborns with anus deformities. Diagnosis (syndrome)?







What is the Correct Answer?

Answer

Currarino syndrome

Currarino syndrome

- Anorectal malformation or congenital anorectal stenosis
- Sacrococcygeal osseous defect
- Presacral mass
  - anterior sacral meningocele
  - mature teratoma
  - dermoid/epidermoid cyst

References (RadioGraphics Volume 45, Number 9) 2008 Jan;46(1):48-53.