

**Ultrasound Radiology  
In-Training Test Questions  
for Diagnostic Radiology Residents**



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Sponsored by:

*Commission on Education*

*Committee on Residency Training in Diagnostic Radiology*

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1. Which one of the following is a reliable sonographic sign of a monochorionic diamniotic twin pregnancy?
- A. Thin membrane between sacs in the first trimester.
  - B. Twins of the same gender in separate sacs.
  - C. Lack of a “twin peak” or “delta” sign.
  - D. The placentas of each sac are contiguous with each other.

Rationales:

A. **Correct.** A thick membrane consists of 2 chorions and 2 amnions, which separate dichorionic twins. A thin membrane has no chorion, only 2 amnions. A thick membrane may appear thin later in pregnancy, but not in the first trimester.

B. **Incorrect.** If the twins are of different genders, they are dizygotic and thus dichorionic, diamniotic. If they are of the same gender they may be dizygotic as well as monozygotic.

C. **Correct.** A “twin peak sign” represents a beak-like tongue of placenta protruding between the two double membranes of a dichorionic diamniotic twin. It is not present in a monochorionic pregnancy, because the single chorion surrounds both sacs. However, this sign is not always seen in a dichorionic pregnancy.

D. **Incorrect.** Visualization of 2 separate placentas is consistent with a dichorionic pregnancy. However, 2 separate placentas that abut each other may be indistinguishable in appearance from a single placenta.

Citations:

Brant. *Ultrasound: The Core Curriculum*. 1st ed. Lippincott Williams & Wilkins, Philadelphia, PA. 2001.

2. Concerning the umbilical artery systolic/diastolic (S/D) ratio, which one of the following is TRUE?
- A. The angle of insonation must be kept between 45 and 60 degrees.
  - B. The degree of S/D ratio abnormality correlates with the extent of fetal compromise
  - C. An S/D ratio of greater than 4 is abnormal after 30 weeks.
  - D. Absent diastolic flow is of no concern prior to 20 weeks.

Rationales:

A. *Incorrect.* The S/D ratio compares the amplitude of peak systole to end diastole, so that the angle of insonation is unimportant as long as an adequate signal can be obtained.

B. *Incorrect.* They do not correlate.

C. **Correct.** The 90th percentile S/D ratio at 30 weeks is 3.8, and this value keeps dropping as placental resistance continues to decrease with further fetal maturation. An S/D ratio of 4 is considered abnormal after 30 weeks.

D. *Incorrect.* It is abnormal. There should be diastolic flow between 15 and 20 weeks.

Citations:

Callen PW. *Ultrasonography in Obstetrics and Gynecology*. WB Saunders.

Middleton WD, Kurtz AB, Hertzberg BS: *Ultrasound: The Requisites*, 2nd ed. St. Louis, Mosby, 2004.

3. Concerning echogenic intracardiac focus on OB ultrasound, which one is CORRECT?
- A. Majority are located in the right ventricle
  - B. Strong association with trisomy 18
  - C. Represents focal fat of ventricular wall
  - D. Most commonly seen as normal variant

Rationales:

A. *Incorrect.* 90% of echogenic intracardiac foci are located in the left ventricle.

B. *Incorrect.* There is an association of trisomy 13 and 21 with echogenic intracardiac focus but not with trisomy 18.

C. *Incorrect.* Echogenic intracardiac focus is felt to represent microcalcifications of papillary muscles.

D. **Correct.** Echogenic intracardiac focus is most commonly seen as a normal variant but should prompt careful examination for other abnormalities.

Citations:

Ultrasonography in Obstetrics and Gynecology by Peter W. Callen. Publisher – W B Saunders. 2000.

4. Which of the following is a TRUE statement concerning ultrasound of the endometrium in premenopausal women?
- A. The endometrium can normally measure up to 13 mm in thickness.
  - B. Endometrial fluid should be included in the measurement of endometrial thickness.
  - C. The hypoechoic halo surrounding the endometrium should be included in the measurement of endometrial thickness.
  - D. The thickness of the endometrium will vary during the menstrual cycle but echogenicity will not change.

Rationales:

- A. **Correct.** The endometrium can normally measure up to 15 mm during the secretory phase of menstrual cycle.
- B. *Incorrect.* Endometrial fluid should not be included in the measurement of endometrial thickness. The individual walls should be measured separately and added together for final measurement.
- C. *Incorrect.* Thickness and echogenicity of endometrium will change throughout the menstrual cycle.
- D. *Incorrect.* The hypoechoic halo surrounding the endometrium is felt to represent the compact layer of the myometrium and should not be included in measurements of the endometrium.

Citations:

Ultrasonography in Obstetrics and Gynecology by Peter W. Callen. Publisher – W B Saunders. 2000. Middleton WD, Kurtz AB, Hertzberg BS: Ultrasound: The Requisites, 2nd ed. St. Louis, Mosby, 2004.

5. At what hCG level should you expect to visualize an intrauterine gestational sac?
- A. 50 IU (IRP)
  - B. 500 IU (IRP)
  - C. 2000 IU (IRP)
  - D. 10,000 IU (IRP)

Rationales:

C. **Correct.** A intrauterine gestational sac should typically be visualized when the hCG is 2000 IU IRP.

Citations:

Cacciatore B. Can the status of tubal pregnancy be predicted with transvaginal sonography? A prospective comparison of sonographic, surgical, and serum hCG findings. Radiology 1990;177:481-484.

Barnhart K, Mennuti MT, Benjamin I, Jacobson S, Goodman D, Coutifaris C. Prompt diagnosis of ectopic pregnancy in an emergency department setting. Obstet Gynecol 1994;84:1010-1015.

Mehta TS, Levine D, Beckwith B. Treatment of ectopic pregnancy: is a human chorionic gonadotropin level of 2,000 mIU/mL a reasonable threshold? Radiology 1997;205:569-573.

Bateman BG, Nunley WC, Jr., Kolp LA, Kitchin JD, 3rd, Felder R. Vaginal sonography findings and hCG dynamics of early intrauterine and tubal pregnancies. Obstet Gynecol 1990;75:421-427.

6. Concerning polyhydramnios, which of the following is CORRECT?

- A. Is not diagnosed in the first trimester.
- B. When associated with UPJ obstruction, it results in low urine output.
- C. Diabetes mellitus is a frequent cause of increased amniotic fluid.
- D. Polyhydramnios rarely spontaneously resolves.

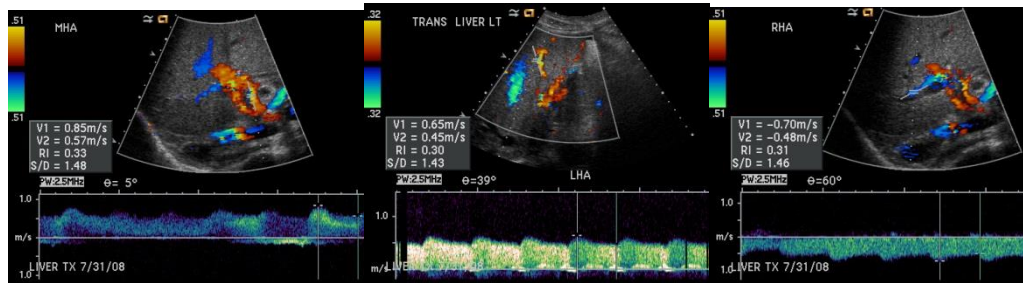
Rationales:

- A. *Incorrect.* Polyhydramnios, an excessive accumulation of amniotic fluid may occur throughout the pregnancy.
- B. *Incorrect.* Paradoxically, polyhydramnios associated with UPJ obstruction results in high urine output.
- C. **Correct.** Diabetes mellitus is a common cause of polyhydramnios and frequently involves patients with poor diabetic control.
- D. *Incorrect.* Polyhydramnios frequently resolves spontaneously. These pregnancies are not associated with increase in either morbidity or mortality.

Citations:

Callen PW. Ultrasonography in Obstetrics and Gynecology, Fourth Edition, 2000, Page 650-652.

7. You are shown Doppler images of the main, left, and right hepatic arteries (Figure 1, Figure 2 and Figure 3) in a patient who underwent a liver transplant two months ago. What is the most likely diagnosis?



- A. Proximal hepatic artery stenosis
- B. Distal hepatic artery stenosis
- C. Hepatic venous anastomotic stricture
- D. Transplant rejection

Rationales:

- A. **Correct.** A tardus parvus waveform is present, as is apparent from the shape of the waveform and the resistive indices below 0.4. This indicates a stenosis upstream from where these waveforms were obtained, typically at the hepatic artery anastomosis in a liver transplant patient.
- B. *Incorrect.* Hepatic artery stenoses produce focally elevated velocities at the point of narrowing and diminished diastolic flow if interrogated proximal to the narrowing.
- C. *Incorrect.* This abnormality typically does not produce hepatic arterial waveform changes. It is evident in the hepatic venous waveforms, which typically become monophasic.
- D. *Incorrect.* Liver transplant rejection may not be evident on ultrasound, but if rejection is present and hepatic waveforms are abnormal, the abnormality is typically a higher resistance waveform than normal in the hepatic artery.

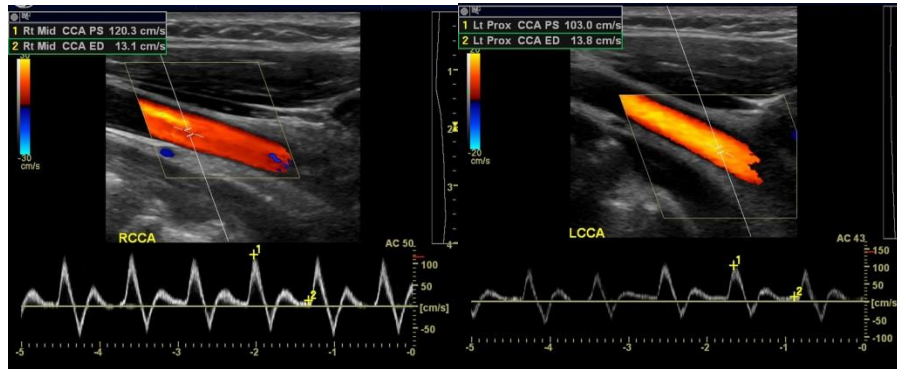
8. In a patient with a prior history of papillary thyroid cancer, which of the following features of a neck lymph node would most likely be considered benign?
- A. Cystic change
  - B. Fatty hilum
  - C. Microcalcifications
  - D. Increased vascularity

Rationales:

- A. *Incorrect.* This typically indicates necrosis in a malignant lymph node.
- B. **Correct.** This is a feature of normal neck nodes.
- C. *Incorrect.* This is a feature of metastatic papillary cancer.
- D. *Incorrect.* This often indicates malignancy.



9. You are shown two images from a carotid ultrasound in a 65-year old male. What is the most likely etiology of this waveform in the carotid arteries?



- A. Proximal carotid stenosis
- B. Aortic regurgitation
- C. Aortic stenosis
- D. Cardiac arrhythmia

Rationales:

- A. *Incorrect.* Proximal carotid stenosis or aortic stenosis will demonstrate a tardus parvus waveform.
- B. **Correct.** Bilateral carotid artery waveforms demonstrate reversal of diastolic flow which is seen in aortic regurgitation (insufficiency). Proximal carotid stenosis or aortic stenosis will demonstrate a tardus parvus waveform.
- C. *Incorrect.* Aortic stenosis gives rise to a tardus parvus waveform in both carotid arteries.
- D. *Incorrect.* Arrhythmias usually appear as irregular pulses, with different appearances depending on the type of arrhythmia.

10. Considering isolated pancreas transplantation:

- A. The organ is typically transplanted in an extraperitoneal location.
- B. The ultrasound identification of a partial thrombus in the transplanted splenic vein requires immediate re-operation.
- C. Enteric drainage is the preferred conduit for managing pancreatic endocrine secretions.
- D. Anastomotic pseudoaneurysm formation is most often caused by leaking digestive enzymes.

Rationales:

- A. *Incorrect.* Intraperitoneal.
- B. *Incorrect.* Quite common with the decreased flow after the spleen is removed.
- C. *Incorrect.* It's the exocrine secretions.
- D. **Correct.**