

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



**QUALITY IS OUR IMAGE**

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Sponsored by:

*Commission on Education*

*Committee on Residency Training in Diagnostic Radiology*

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1. Concerning Tamoxifen and its effects on the uterus, which of the following is correct?
  - A. **Frequently results in thickening and cystic change of the endometrium in post menopausal women.**
  - B. Typically causes atrophy of endometrium in post menopausal women due to its antiestrogenic effects.
  - C. Associated with decreased risk of endometrial cancer.
  - D. Can be used in treatment of endometrial hyperplasia in post menopausal women.

**Rationale:**

- A. Correct. Tamoxifen frequently results in thickening and cystic changes of the endometrium in post menopausal women.
- B. Incorrect. Although tamoxifen has antiestrogenic effects which is basis for its use as an adjuvant treatment in breast cancer, tamoxifen can have estrogenic effects in post menopausal women that can result in thickening and cystic change of the endometrium rather than atrophy.
- C. Incorrect. Tamoxifen is associated with an increased risk of endometrial cancer.
- D. Incorrect. Tamoxifen is actually associated with an increased risk for endometrial hyperplasia rather than used as a treatment.

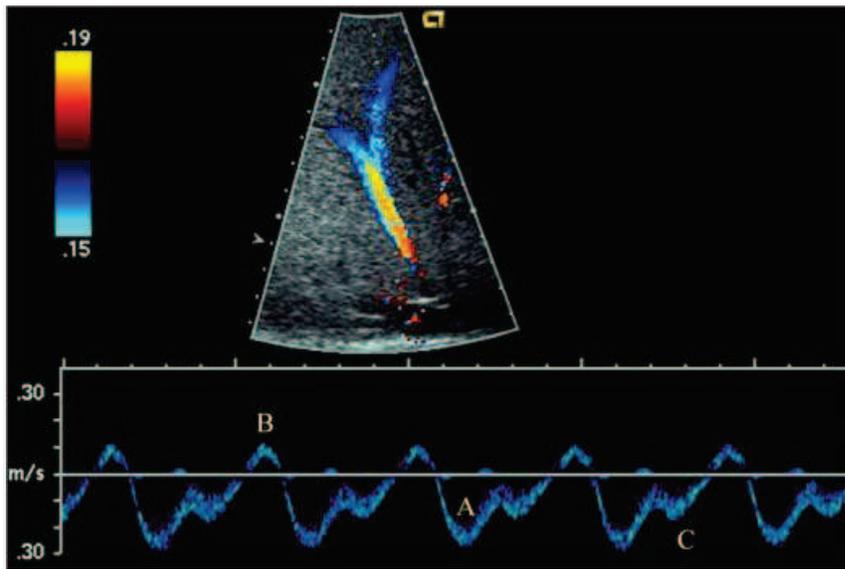
**Reference:**

Peter W. Callen, Ultrasonography in Obstetrics and Gynecology 4th edition, Chapter 29 "Ultrasound of the Uterus", Pgs. 841-842.

Rumack CM, Wilson SR, Charboneau JW, Diagnostic Ultrasound 3rd edition, Chapter 15 "Gynecologic Ultrasound", Pg 549.

William E. Brant, The Core Curriculum: Ultrasound, Chapter 5 "Female Pelvis Ultrasound", pg 190.

2. Figure 1.A represents the hepatic vein waveform. Which of the following statements is true?
- A. Point A on the tracing is known as the d-wave.
  - B. Point B on the tracing is known as the s-wave.
  - C. Point C on the tracing occurs during tricuspid valve opening.
  - D. **Atrial contraction causes the brief reversal of flow.**



**Rationale:**

- A. Incorrect - S
- B. Incorrect - A wave
- C. Incorrect - occurs at saturation of the right heart chambers
- D. Correct.

**Reference:**

Allan et.al. **Clinical Doppler Ultrasound** Allan et.al. 2nd edition 2006  
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3. Regarding testicular torsion:
- A. It is ruled in when there is asymmetric flow on color Doppler between the testes.
  - B. Doppler has equal sensitivity in the pediatric and adult populations.
  - C. **A high resistance arterial waveform in spermatic artery may be the only imaging finding in partial torsion.**
  - D. The bell clapper deformity does not predispose to testicular torsion.

**Rationale:**

- A. Incorrect. No, could be orchitis
- B. Incorrect. No, not as good in peds.
- C. Correct. Yes with compromised venous outflow.
- D. Incorrect. The bell clapper deformity does predispose to testicular torsion. They should flunk automatically if they pick this one.

**Reference:**

Allan et.al. **Clinical Doppler Ultrasound** Clinical Doppler Ultrasound 2nd edition 2006  
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4. You are shown two sonographic images (Figures 2 A and 2B) of the liver of a 53-year-old woman with abnormal liver function tests. In addition to the gallstone, which one of the following is the MOST likely diagnosis?
- A. Glycogen storage disease with hepatic adenomas
  - B. Multifocal hepatocellular carcinoma
  - C. **Focal fatty sparing**
  - D. Metastatic neoplasm

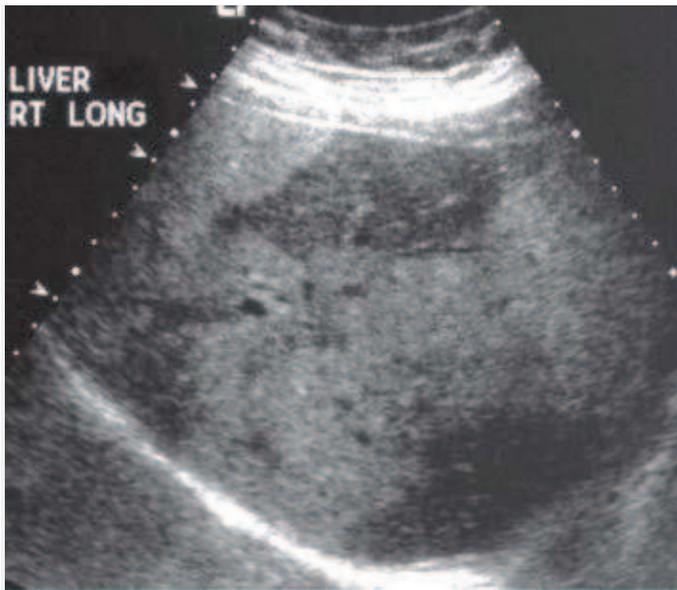


Figure 2.A



Figure 2.B

**Rationale:**

- A. Incorrect. The liver is diffusely hyperechoic in type I glycogen storage disease, and secondary hepatic adenomas of variable echogenicity are seen with this congenital abnormality. However, the adenomas have the appearance of typical ovoid masses, with mass effect.
- B. Incorrect. Hepatocellular carcinoma also may demonstrate variable echogenicity, but the lesions typically show a mass contour and a mass effect. They may have a thin, hypoechoic, peripheral margin. They tend to become heterogeneous as they enlarge. Infiltrative lesions have a less distinct margin.
- C. Correct. The features of this diagnosis are present in this case. Focal fatty sparing commonly occurs adjacent to the gallbladder and along the liver margins, as in this case.
- D. Incorrect. Rationale similar to that of hepatocellular carcinoma. Some metastases may typically calcify.

**Reference:**

None

5. You are shown sonographic images of the right ovary (Figure 4A), sagittal right upper quadrant (Figure 4B), and left lower quadrant (Figure 4C) of a 32-year-old woman. Which one of the following is the MOST likely diagnosis?
- A. Peritoneal carcinomatosis due to ovarian carcinoma
  - B. **Ovarian hyperstimulation syndrome**
  - C. Tubo-ovarian abscess
  - D. Polycystic ovary disease

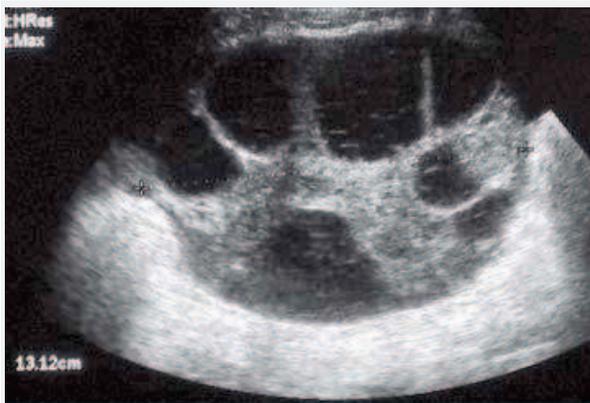


Figure 4.A



Figure 4.B



Figure 4.C

**Rationale:**

- A. Incorrect. There is no evidence of an ovarian mass to suggest ovarian carcinoma. The visualized ascites demonstrates simple characteristics without evidence of peritoneal masses or studding.
- B. Correct. This syndrome occurs frequently as a complication of ovulation induction. The features of this diagnosis are present in this case.
- C. Incorrect. There is no evidence of complex cystic adnexal or ovarian masses to suggest this diagnosis.

D. Incorrect. The typical sonographic findings of polycystic ovary disease (PCO) are ovarian enlargement containing multiple small follicles, increased stromal echogenicity, and thickened endometrium. In this case, the ovaries are greatly enlarged, containing theca lutein cysts that are larger than the typical small follicles seen with PCO. In addition, ascites and pleural effusions are not common findings in PCO.

**Reference:**

None

6. You are shown a transverse gray scale image through the liver (Figure 5A), a transverse pulsed spectral Doppler image (Figure 5B), and a Doppler image through the porta hepatis (Figure 5C) of a 73-year-old man with hepatomegaly. Which one of the following is the MOST likely diagnosis?
- A. Portal hypertension
  - B. Compensated cirrhosis
  - C. Hepatic venoocclusive disease
  - D. **Passive hepatic congestion**

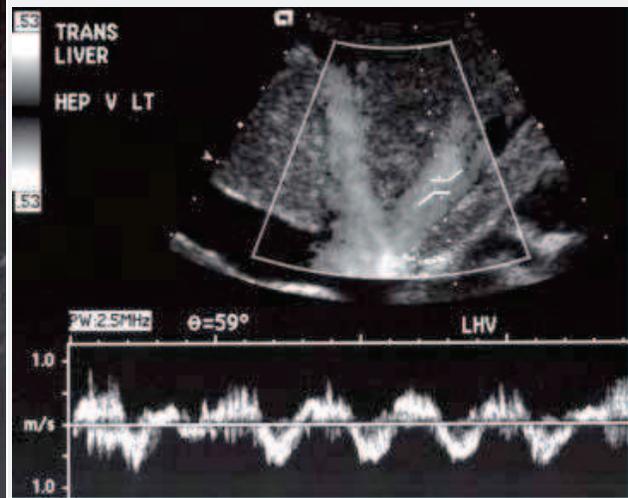


Figure 5.B

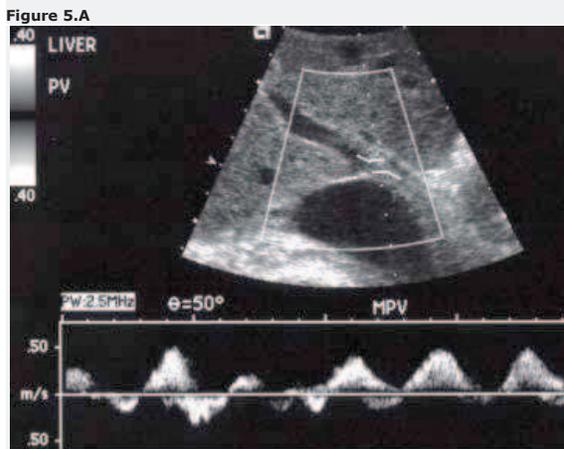


Figure 5.C

**Rationale:**

- A. Incorrect. Portal venous flow may be biphasic in moderately severe portal hypertension, but it does not become hyperdynamic and it is not associated with increased pulsatility in enlarged hepatic veins. The hepatic waveform becomes dampened, with decreased amplitude of the normal oscillations and loss of the retrograde pulse. Eventually it becomes monophasic and turbulent due to narrowing of the hepatic veins.
- B. Incorrect. The same reasoning applies as above. This is an earlier phase prior to the development of portal hypertension.
- C. Incorrect. The hepatic veins are narrow with no increased pulsatility.
- D. Correct. Hepatomegaly, enlarged IVC and hepatic veins, and prominent pulsatility in the hepatic and portal veins (particularly when the portal vein flow dips below the baseline) are typical for right-sided heart failure.

**Reference:**

None

7. What kinds of twins are depicted in the sonogram show (Figure 5)?
- A. Diamniotic dichorionic
  - B. **Diamniotic monochorionic**
  - C. Monoamniotic monochorionic
  - D. Conjoined twins

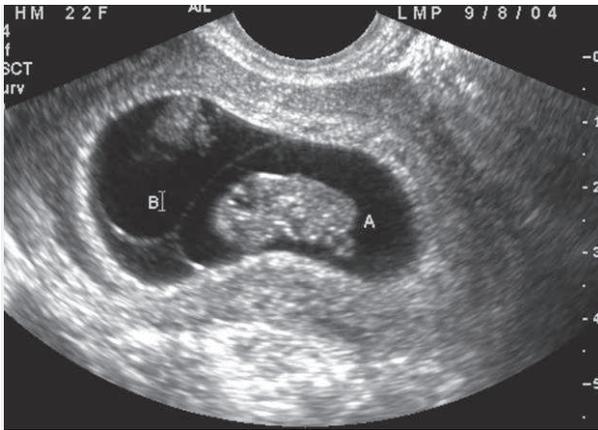


Figure 5

**Rationale:**

- A. Incorrect.
- B. The image shows an 8 week pregnancy with a single placenta with thin dividing membranes surrounding each embryo consistent with diamniotic monochorionic twins. A. is incorrect since there would be a thick dividing membrane with dichorionic twins at this gestational age. C. is incorrect since there should be no dividing membrane in monoamniotic twins. D. is incorrect since the twins are clearly separate.
- C. Incorrect.
- D. Incorrect.

**Reference:**

Finberg HJ. The "twin peak" sign: reliable evidence of dichorionic twinning. J Ultrasound Med 1992;11:571. Kurtz AB. Twin pregnancies: accuracy of first-trimester abdominal US in predicting chorionicity and amnionicity. Radiology. 1992 Dec;185(3):759-62.

8. Concerning deep venous thrombosis (DVT), which one is TRUE?
- A. Venous compression is performed in longitudinal orientation of the vein.
  - B. 60% of patients with lower extremity DVT have thrombus in the iliofemoral region.
  - C. The diameter of the affected vein is decreased in acute deep venous thrombosis.
  - D. **Inability to obliterate the vein lumen completely is the diagnostic criterion.**

**Rationale:**

- A. Incorrect. The venous compression is performed in the transverse orientation of the vein to minimize the chance of the transducer slipping off the vein.
- B. Incorrect. Only 10% of the patients with lower extremity DVT have thrombus in the iliofemoral region. It is important to recognize this as these patients present with buttock or groin pain.
- C. Incorrect. The diameter of the affected vein is increased in acute DVT.
- D. Correct. The compression technique is more sensitive and specific in the diagnosis of DVT compared to other criteria such as augmentation, gray scale visualization and color flow Doppler.

**Reference:**

Bang C. Lower and upper extremity Deep Venous Thrombosis Evaluation. In Dogra V, Rubens DJ(eds): Ultrasound Secrets. 1st Edition. Philadelphia;Hanley and Belfus; 2004. Page 337-349. Fraser JD and Anderson DR. Venous protocols, techniques and interpretations of the upper and lower extremities. Radiol Clin N Am 42 (2004): 279-296

9. A patient is seen in the ultrasound suite for early pregnancy with bleeding. She is certain that her last menstrual period was 10 weeks ago. An intrauterine sac is visualized with mean sac diameter of 8 mm with a yolk sac but no embryonic pole. Which one is TRUE?
- A. This is a miscarriage, and dilatation and curettage should be performed.
  - B. **It is unclear if this is a miscarriage or a normal early pregnancy and follow-up should be obtained.**
  - C. The findings are consistent with a pregnancy of about 6 weeks. The patient is probably wrong about her dates. The pregnancy should be re-dated.
  - D. The findings are consistent with a pregnancy of about 8 weeks. The patient is probably wrong about her dates. The pregnancy should be re-dated.

**Rationale:**

- A. Incorrect.
- B. Correct. The findings are consistent with a pregnancy of about 6 weeks, but given that the patient is bleeding and by dates she should be 10 weeks, follow-up should be obtained. A. is incorrect since there is a possibility that the patient is wrong about her dates, and dilatation and curettage should not be performed if it is possible that this is a normal early pregnancy. C is incorrect since the pregnancy should not be redated until an embryonic pole is visualized. D. is incorrect since no embryonic pole is seen and therefore the pregnancy is not 8 weeks.
- C. Incorrect.
- D. Incorrect.

**Reference:**

Callen PW. Ultrasonography in obstetrics and gynecology. 4th ed. Philadelphia, PA: W.B. Saunders Co., 2000; 364-367.

10. Which one of the following is associated with the highest incidence of fetal morphologic anomalies?

- A. **poorly-controlled diabetic taking insulin**
- B. patient taking a beta blocker for control of hypertension
- C. trauma patient with abdominal pain
- D. patient with prior pregnancy with amniotic band syndrome

**Rationale:**

- A. Correct. Glucose is a teratogen. Poorly controlled diabetics have a high incidence of fetal morphologic abnormalities such as sacral dysgenesis, neural tube defects, and cardiac abnormalities. B. is incorrect since beta blockers are safe for use in pregnancy. C. is incorrect since trauma can cause abruption, and thus fetal demise, but should not cause a morphologic abnormality. D. is incorrect since amniotic band syndrome is typically sporadic and therefore does not have a high recurrence risk.
- B. Incorrect.
- C. Incorrect.
- D. Incorrect.

**Reference:**

Gabbe SG, Niebyl JR, Simpson JL. Obstetrics: normal and problem pregnancies. 4th ed. New York, NY: Churchill Livingstone, 2002; 1090-1091. Zaw W, Stone DG. Caudal regression syndrome in twin pregnancy with type II diabetes. J Perinatol 2002;22:171-174. Callen PW. Ultrasonography in obstetrics and gynecology. 4th ed. Philadelphia, PA: W.B. Saunders Co., 2000; 364-367. Freinkel N, Lewis NJ, Akazawa S, Roth SI, Gorman L. The honeybee syndrome: implication of the teratogenicity of mannose in rat-embryo culture. N Engl J Med 1984; 310:223-230