Ultrasound Radiology
In-Training Test Questions
for Diagnostic Radiology Residents

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1. 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.

2. Concerning the diagnosis of acute deep vein thrombosis (DVT), which one of the following is TRUE?

A. No flow on routine color Doppler with low level venous echoes is diagnostic.
B. Loss of complete compressibility is the most specific finding.
C. An elevated D-dimer blood level is sensitive and specific for DVT.
D. Loss of respiratory variation in flow suggests distal venous thrombosis.

Rationales:
A. Incorrect. Augmentation by squeezing the calf is often needed to completely fill the vessel with color. The low level echoes visualized may be due to sluggish venous flow with visible red blood cell rouleaux.
B. Correct. Analysis of vessel content echogenicity is not reliable, and color Doppler may be absent due to slow flow.
C. Incorrect. Plasmin lysis of the cross-linked fibrin found in a thrombus generates the D-dimer fragment. An elevated D-dimer level is sensitive, but not specific as it is found in many clinical conditions. However, D-dimer level determination can rule out acute DVT, due to its high sensitivity and high negative predictive value.
D. Incorrect. It suggests disease proximal to the transducer position.
Citations:

3. Concerning tunica albuginea cysts, which one is TRUE?
A. They are intratesticular in location.
B. They are not palpable.
C. They range from 2 mm to 5 mm in size.
D. They are located in the posterior and inferior aspect of testis.

Rationales:
A. Incorrect. Tunica Albuginea cyst are extratesticular in location, however when large in size may mimic an intratesticular cyst.
B. Incorrect. These cysts are palpable and patients present with a palpable lump.
C. Correct. These cysts are of mesothelial origin and range from 2-5 mm in size.
D. Incorrect. Their characteristic location is at the upper anterior or lateral aspect of the testicle.

4. 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.
5. 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.

6. Which statement is TRUE concerning acute ovarian torsion?

A. It presents as a hyperechoic small ovary without follicles.
B. The majority of patients are postmenopausal.
C. It is typically managed medically rather than surgically.
D. It is commonly associated with ovarian neoplasms or cysts.

Rationales:
A. Incorrect. Typically presents as enlarged ovary with multiple peripheral follicles.
B. Incorrect. Most common to present in the first 3 decades of life.
C. Incorrect. Acute ovarian torsion is managed surgically.
D. Correct. 50% to 81% of patients have unilateral ovarian tumor (frequently dermoid or parovarian cyst).

7. Which statement is TRUE concerning color flow Doppler artifacts?

A. Twinkle artifact can be seen posterior to renal stones.
B. Aliasing occurs when the Doppler shift frequency exceeds twice the pulse repetition frequency.
C. Aliasing artifacts can be eliminated by utilizing a higher frequency transducer.
D. Color “bleed" can be eliminated by increasing the color gain.
Rationales:
A. **Correct.** Twinkle artifact is generated by a strongly reflecting medium composed of individual reflectors such as stones. The twinkling artifact is generated by a narrow band of intrinsic machine noise called phase (or clock) jitter.
B. Incorrect. Aliasing occurs when the Doppler shift frequency exceeds half the pulse repetition frequency.
C. Incorrect. Aliasing artifact can be eliminated by utilizing lower frequency transducer resulting in a decrease in the frequency shift.
D. Incorrect. Color “bleed” is seen when the color in a vessel extends beyond the vessel lumen, obscuring the wall or important findings such as plaque. It can be eliminated by decreasing the color gain.

8. Which of the following is a TRUE statement regarding imaging of a first-trimester intrauterine pregnancy?

A. The first fetal anatomic structure to be seen is the yolk sac.
B. It is abnormal to have separation of the amnion and chorion.
C. Cardiac activity should be seen by 4 weeks.
D. Gestational sac measurement is the single best measurement for estimating gestational age between 6 and 12 weeks.

Rationales:
A. **Correct.** Yolk sac is the first fetal structure identified by ultrasound.
B. Incorrect. There is normal separation between the chorion and amnion until 12 to 16 weeks when these structures fuse.
C. Incorrect. The threshold for detecting cardiac activity is 5 to 6 weeks.
D. Incorrect. CRL (crown rump length) is the single best measurement for estimating gestational age by ultrasound between 6 to 12 weeks.

9. Regarding the anatomy of the lower extremity veins, which one of the following statements is TRUE?

A. The popliteal vein is formed by the confluence of the anterior tibial and posterior tibial veins.
B. The femoral and popliteal veins are duplicated in approximately 25% of patients.
C. The first deep branches of the popliteal vein traveling into the calf are the paired peroneal veins.
D. The gastrocnemius and soleal veins accompany an artery of the same name.
RATIONALES:
A. Incorrect. The popliteal vein is formed by the junction of the anterior tibial, posterior tibial and peroneal veins.
B. Correct. Duplication can involve only a portion of the vein segment, or the veins can be duplicated along their entire course.
C. Incorrect. The first deep branches are the anterior tibial veins.
D. Incorrect. These veins are muscular veins and do not have accompanying arteries.

References:

10. Concerning renal allograft complications, which of the following is TRUE?
A. Postoperative ultrasound is useful in differentiating rejection from acute tubular necrosis.
B. Arterial stenosis is the most common vascular complication.
C. Urinomas occur 1-2 months or later after surgery.
D. Hydronephrosis 1-2 weeks post-op is typically due to obstructing debris, such as blood clots in the ureter.

RATIONALES:
A. Incorrect. Sonography is neither sensitive nor specific for allograft rejection.
B. Correct. About 10% of transplant patients can develop renal arterial stenosis, typically located at the renal artery anastomosis with the external iliac artery.
C. Incorrect. Urinomas occur in the immediate postoperative period.
D. Incorrect. Mild hydronephrosis of the allograft during the first or second week post transplantation is typically due to postoperative edema at the insertion site of the ureter into the bladder.

References:
11. 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.

References:

12. Concerning autosomal-recessive polycystic kidney disease (ARPKD), which of the following is CORRECT?

A. Children with ARPKD have both kidney and liver disease.
B. Children with ARPKD do not survive beyond the first year of life.
C. During the last trimester of pregnancy, ARPKD and multicystic dysplastic kidney disease cannot be differentiated.
D. When seen in late stages of fetal life the kidneys in ARPKD are normal to small in size.

RATIONALES:
A. Correct. If the child survives the renal disease in infancy, the liver disease will become clinically apparent.
B. Incorrect. ARPKD children may survive a number of years.
C. Incorrect. Multicystic dysplastic kidney size is always proportional to the size and number of visible cysts as compared to ARPKD, where the size and number of visible cysts will not account for the renal size.
D. Incorrect. With ARPKD the kidneys are 3 to 10 times normal size in the late stages of fetal life.

Reference: