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Self Assessment Module on Body Imaging: Women's Imaging

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Imaging of Abdominal Pain in Pregnancy

Question 1: Teratogenic effects of ionizing radiation on a conceptus are

- a) Deterministic
- b) Non-threshold
- c) Stochastic
- d) Random

Correct Answer: A

Rationale: A is the correct answer. Teratogenic effects of ionizing radiation are deterministic (inevitable outcome of antecedent sufficient causes), dose-dependent or threshold related. Carcinogenesis is a stochastic (random), non-threshold effect.

Reference: De Santis M., Di Gianantonio E., Straface G., Cavaliere A.F., Caruso A., Schiavon F., Berletti R., Clementi M. Ionizing radiations in pregnancy and teratogenesis: a review of literature. Reproductive Toxicology, 2005: 323-329

Question 2: Teratogenic effects from ionizing radiation are:

- a) Most common in the third trimester
- b) Known to happen below a threshold dose
- c) Most commonly CNS in origin
- d) Reversible

Correct Answer: C

Rationale: Teratogenic effects from ionizing radiation happen during organogenesis, in the early fetal stage of development. The central nervous system is very radiosensitive and radiation changes to the CNS are the most frequently recognized teratogenic effects seen. Teratogenesis is not reversible.

Reference: http://www.acr.org/SecondaryMainMenuCategories/quality_safety/guidelines/dx/Pregnancy.aspx; 13

Question 3: Iodinated contrast

- a) Is unsafe in pregnancy
- b) Is an FDA class C drug
- c) Crosses the placenta
- d) Excreted in high doses in the breast milk

Correct Answer: C

Rationale: Iodinated contrast is a FDA Class B Drug which is known to cross the placenta and is excreted in very small amounts in the breast milk. It is felt to be appropriate to use in the setting of pregnancy when the benefits outweigh the risks

References: Jaffe TA, Miller CM, Merkle EM. Practice Patterns in Imaging of the Pregnant Patient with Abdominal Pain: A Survey of Academic Centers. AJR 2007;1128-1134
ACR Manual on Contrast Media 6.0, 2008;61

Question 4: Gadolinium-based contrast agents

- a) Are FDA class B drugs
- b) Cross the placenta
- c) Are safe in all trimesters of pregnancy
- d) Are associated with renal failure in the mother

Correct answer C

Rationale: Gadolinium based contrast agents are FDA class C drugs. Gadolinium crosses the placenta and has been shown to chelate in the repetitive fetal circulation in animal models; its effects in utero are not known. There is no link between maternal renal failure and gadolinium exposure.

Reference: ACR Manual on Contrast Media 6.0, 2008;61

MRI of the Female Pelvis

Question 5: Of all of the MR sequences, which is best for zonal anatomy of the uterus?

- a) T1
- b) T1 with fat saturation
- c) T1 post contrast
- d) T2

Correct answer D

Rationale: T2-weighted images are the best for delineation of uterine zonal anatomy.

Reference: Dykes T.M., Siegel C., Dodson W. Imaging of Congenital Uterine Anomalies: *Review and Self-Assessment Module* AJR 2007; 189: S1 - S10.

Masui T, Katayama M, Kobayashi S, Nakayama S, Nozaki A, Kabasawa H, et al. Changes in Myometrial and Junctional Zone Thickness and Signal Intensity: Demonstration with Kinematic T2-weighted MR Imaging Radiology 2001: 75-85.

Question 6: Which of the Müllerian anomalies can be treated with hysteroscopic metroplasty?

- a) Bicornuate uterus
- b) Didelphus uterus
- c) Septate uterus
- d) Unicornuate uterus

Correct Answer C

Rationale: The septum in a septate uterus may be resected hysteroscopically without injury to the uterine fundus, in contrast to a bicornuate uterus which requires open metroplasty. Unicornuate and didelphic uteri are not treated surgically

Reference: Fielding JR. MR imaging of Mullerian anomalies: impact on therapy. AJR 1996; 167: 1491 - 1495.

Question 7: Stage IIB cervical cancer is defined as

- a) Parametrial invasion
- b) Upper vaginal invasion
- c) Tumor confined to the cervix
- d) Invasion of the bladder or rectum

Correct Answer A

Rationale: Stage I cervical cancer is defined as confined to the cervix, clinically microscopic (IA) or macroscopic (IB). Stage II cervical cancer has spread from the cervix but not the pelvic sidewall: IIA is upper vaginal involvement, IIB is parametrial involvement. Stage III extends to the pelvic sidewall and Stage IV is extension of tumor beyond the true pelvis or clinical invasion of the bladder or rectum.

Reference: Pecorell S, Odicino F. Cervical cancer staging. The Cancer Journal 2003; 9:392.

MRI of the Pelvis: Part II – MR of Pelvic Floor Dysfunction and Fibroids

Question 8: Which of the following is False regarding the MRI assessment of uterine fibroids prior to UFE?

- a) Submucosal fibroids are at risk for cavitation and expulsion after UFE.
- b) UFE is contraindicated in the presence of pedunculated, subserosal fibroids due to a high risk of post-procedure complications.
- c) When present, the "bridging vascular sign" can help distinguish between a subserosal fibroid and an ovarian neoplasm.
- d) MRI is sensitive for the detection of enlarged ovarian arteries in patients with fibroids.
- e) Fibroids that enhance poorly with intravenous contrast administration on pre-embolization MRI are less likely to decrease in volume after treatment than fibroids that enhance avidly.

Correct answer B.

Rationale: Answer: B is false. Pedunculated, subserosal fibroids can be safely embolized, although they may not decrease in size as much as intramural fibroids after treatment

Toor, S.S., K.T.Tan, ME Simons, D.K. Rajan, J.R Beecroft, E. Hayeems, K.W. Sniderman. Clinical Failure after Uterine Artery Embolization: Evaluation of Patient and MR Imaging Characteristics, J. Vasc Interv Radiol 2008; 19:662-668

A.J. Smeets, R.J. Nijenhuis, P.F. Boekkooi, H.A.M. Vervest, W.J. van Rooij, J. de Vries, P.N.M> Lohle. Safety and Effectiveness of Uterine Artery Embolization in Patients with Pedunculated Fibroids, J Vasc Interv Radiol 2009; 20:1172-1175

R. Margau, M.E. Simons, D.K. Rajan, E.B. Hayeems, K.W. Sniderman, K. Tan, J.R. Beecroft, J.R. Kachura. Outcomes after Uterine Artery Embolization for Pedunculated Subserosal Leiomyomas, *J. Vasc Interv Radiol* 2008; 19:657-661

Question 9: Which of the following is False regarding measurements performed on a midline sagittal MR image obtained at rest and with maximal straining?

- a) The M-line (drawn perpendicular from the pubococcygeal line to the posterior anorectal junction) typically decreases in length to less than 2 cm during straining in patients with significant pelvic organ prolapse.
- b) An increase in the length of the H-line (drawn from the inferior pubic symphysis to the posterior anorectal junction) can be seen in patients with significant pelvic organ prolapse.
- c) A levator plate angle that remains less than 10 degrees with straining is a normal finding.
- d) Descent of the bladder base more than 1 cm below the pubococcygeal line with straining is considered abnormal.
- e) An anterior rectal bulge of 4 cm (measured between the anal canal and the anterior rectal wall) is considered an anterior rectocele.

Correct Answer: A

Rationale: The M-line is a measurement of the descent of the levator hiatus and typically elongates in patients with pelvic organ prolapse.

References:

Comiter, C.V, Vasavada, SP, Barbaric, ZL, Gousse, AE, Raz, S. Grading pelvic prolapse and pelvic floor relaxation using dynamic magnetic resonance imaging. *Urology* 54(3): 454-7, 1999

Fielding JR. MR imaging of pelvic floor relaxation. *Radiol Clin North Am* 2003; **41**: 747-756