Tuesday, May 14, 2013

CHEST

Digital Radiography
Robert MacDougall, MSc

1. Which of the following is unaffected by the selection of Value of Interest Look Up Table (VOI-LUT):

   A. Diagnostic information in the processed image
   B. Target Exposure ($E_T$)
   C. Exposure Index (EI)
   D. Deviation Index (DI)
   E. Brightness and contrast of the displayed image

Correct Answer: B

2. Exposure Index (EI) represents:

   A. The exposure at the entrance to the patient
   B. The exposure at the detector plane measured with an ion chamber
   C. The brightness of the displayed image
   D. The exposure at the detector calculated from the mean signal response of the detector within the Values of Interest
   E. The deviation from a target exposure

Correct Answer: D

References
Functional Chest MR Imaging
Hyun Woo Goo, MD, PhD

3. Which one of the followings is the LEAST likely limitation of thoracic MR imaging?

A. Low signal-to-noise ratio due to the low proton density of the lung
B. Potential hazards from ionizing radiation
C. Motion artifacts from respiratory motion and cardiac pulsation
D. Relatively long examination time
E. Susceptibility artifacts from multiple air-tissue interfaces

Correct Answer: B

References

4. Which one of the followings is the MR pulse sequence most commonly used for real-time respiratory dynamic imaging?

A. Balanced steady-state free precession (SSFP)
B. T1-weighted In-phase gradient echo (GE)
C. Short tau inversion-recovery (STIR)
D. Ultra-short echo time (UTE)
E. Velocity encoded cine (VEC)

Correct Answer: A

References
5. What is the current imaging modality of choice for evaluating pediatric patients with clinically suspected pulmonary embolism?

A. Chest radiograph
B. Computed Tomography Pulmonary Angiography (CTPA)
C. Ventilation / Perfusion scan
D. Conventional catheter based pulmonary angiography

Correct Answer: B

6. Which one of following risk factors has a statistically significant association with the presence of unsuspected pulmonary emboli on routine thoracic MDCT examinations of pediatric oncology patients?

A. Surgery within 1 month of MDCT
B. Prior history of transplant
C. Radiation therapy within 1 month of MDCT
D. Underlying coagulation disorder

Correct Answer: D

References

Imaging of Acquired Thoracic Cardiovascular Diseases
Beverley Newman, MD, FACR

7. The accompanying image is a frontal chest radiograph in an 11yo girl with prolonged fever of unknown origin and an elevated erythrocyte sedimentation rate (ESR). Based on the most likely diagnosis, what do you consider the most appropriate next imaging study?
A. No further imaging, the chest radiograph is normal
B. MR angiogram to evaluate for congenital aortic coarctation
C. MRI and MR angiogram to evaluate for vasculitis
D. Functional MRI to evaluate for cardiomyopathy
E. Gated CT angiogram to evaluate for coronary abnormality

Correct Answer: C

References

8. Current advantages of MR over CT cardiovascular imaging include all of the following EXCEPT:

A. No exposure to ionizing radiation
B. Better spatial resolution
C. Superior for cardiac functional and viability assessment
D. Vascular flow quantification
E. Contrast safety and utility of non contrast imaging

Correct Answer: B

References
Interesting Cases
R. Paul Guillerman, MD

9. The likelihood that a lung cyst represents a pleuropulmonary blastoma rather than a congenital pulmonary airway malformation is increased by the presence of which of the following conditions?

A. Spontaneous pneumothorax
B. Multifocal lung cysts
C. Cystic nephroma
D. All of the above
E. None of the above

Correct Answer: D

References

10. Which of the following conditions is not known to be associated with pulmonary alveolar growth abnormalities?

A. Oligohydramnios
B. Congenital heart disease
C. Cystic fibrosis
D. Prematurity
E. Pulmonary interstitial glycogenosis

Correct Answer: C

References

11. Which of the following statements about pulmonary veno-occlusive disease is true?

A. Distinction from primary pulmonary arterial hypertension is usually possible on the basis of the clinical presentation
B. Centrilobular ground-glass opacities, septal thickening and lymphadenopathy are the most suggestive imaging features
C. Pulmonary vasodilators are the safest and most effective treatment
D. Prognosis is favorable with medical therapy
E. All of the above
Correct Answer: B

References

NEURORADIOLOGY

Optimizing Head US Imaging
Lisa H. Lowe, MD, FAAP

12. A 5-week-old term infant undergoes head sonogram. Which sagittal image(s) of the peripheral cortex is/are abnormal?

A. Right
B. Left
C. Both
D. Neither

Correct Answer: A

References
13. Cerebral sonogram of a 2-day-old male with seizures. Where is the lesion located?

A. Subdural space  
B. Cerebrum  
C. Basal ganglia  
D. Cerebellum  

Correct Answer: D

References

Seizure Imaging
Unni K. Udayasankar, MD

14. Which of the following tumors in children often demonstrates an aggressive behavior?

A. Dysembryoplastic neuroepithelial tumor (DNET)  
B. Pleomorphic xanthoastrocytoma (PXA)  
C. Ganglioglioma  
D. Pilomyxoid astrocytoma (PMA)

Correct Answer: D

References
15. Which of the following statements about focal cortical dysplasia (FCD) is true?

A. Most children with FCD do not benefit from epilepsy surgery
B. Non-Taylor types are associated with dysmorphic neurons and balloon cells on pathological examination
C. Tuberous sclerosis and hemimegalencephaly are considered variants of FCD
D. Contrast enhancement and focal mass effect are often present on MRI.

Correct Answer: C

References

16. Which best characterizes hypercellular brain tumor:

A. hyperdensity on CT, hypointensity on T2 and decreased ADC
B. hypodensity on CT, hypointensity on T2 and decreased ADC
C. hyperdensity on CT, hyperintensity on T2 and decreased ADC
D. hyperdensity on CT, hypointensity on T2 and increased ADC

Correct Answer: A

References

17. In the modern era of targeted molecular therapies and immunotherapies which can be used to characterize pseudoproggression?

A. intra-tumoral hemorrhage
B. tumor recurrence
C. heterogeneous tumor response
D. leptomeningeal metastases
E. biopsies

Correct Answer: C

References

Interesting Cases
Yutaka Sato, MD, PhD

18. Which one of the following structures is more often affected in the middle interhemispheric variant (MIV) when compared to classic holoprosencephaly (HPE)?

A. Body of the corpus callosum
B. Hypothalamus
C. Anterior cerebral fissure
D. The 3rd ventricle
E. Ventral frontal cortex

Correct Answer: A

References

19. Which of the following statements regarding neonatal alloimmune thrombocytopenia (NAIT) is incorrect?

A. NAIT is caused by paternal-fetal antigen incompatibility.
B. NAIT accounts for approximately 9% of neonatal thrombocytopenia.
C. Intracranial hemorrhage occurs in 10 – 30% of NAIT, half of which occur in utero.
D. Parenchymal hemorrhage, extraaxial hemorrhage, intraventricular hemorrhage and porencephalic cysts are all seen in NAIT.
E. There is no cost-effective screening program of primiparous women and neonates for this disease.

Correct Answer: A

References
20. All of the below statements regarding infections of the deep neck are correct except:

A. The danger space is dorsal to the retropharyngeal space and ventral to the prevertebral space.
B. The danger space is separated from the retropharyngeal space by the alar fascia and from the prevertebral space by the prevertebral fascia.
C. The danger space extends from the skull base to the coccyx.
D. Retropharyngeal space abscess most commonly originates from lymphadenitis and is seen predominantly in infants.
E. Parapharyngeal and peritonsillar abscesses are more common among adults and older children.

Correct Answer: C

References

GASTROINTESTINAL

Abdominal Applications of DWI
Rutger A.J. Nievelstein, MD

21. The most important advantage of both a respiratory triggered and a free-breathing DWI sequence over a breath-hold DWI sequence in the abdomen is:

A. the possibility to obtain only thick slices
B. the possibility to apply a higher number of b-values
C. the lower susceptibility to motion artifacts and volume averaging
D. the shorter scan time

Correct Answer: B

References

22. When DWI of the abdomen is primarily used for visual assessment of pathology typically high b-values are used. However, in the liver the use of low b-value DWI is preferred for lesion detection, because:

A. low b-value DWI is less prone to cardiac motion-induced signal loss
B. in low b-value DWI the background is better suppressed than in high b-value DWI
C. low b-value DWI allows using shorter echo times
D. low b-value DWI is more effective in suppressing the vasculature than high b-value DWI

Correct Answer: A

References

Update on MR Contrast Agents and Applications
Shreyas S. Vasanawala, MD, PhD

23. Which of the following agents is a conventional extracellular agent?

A. Gadofosveset  
B. Gadoxetate 
C. Gadobutrol 
D. Ferumoxytol 
E. None of the above

Correct Answer: C

24. Which agent reversibly binds to albumin?

A. Gadofosveset 
B. Gadoxetate 
C. Gadobutrol 
D. Ferumoxytol 
E. None of the above

Correct Answer: A

References
1. MS-325: albumin-targeted contrast agent for MR angiography.
Rex Shunt Interventions
James S. Donaldson, MD

25. The Rex Shunt is appropriate for which of the following:

   A. Abernethy malformation Type I
   B. A complication of umbilical venous catheterization
   C. Veno-occlusive disease
   D. Budd Chiari
   E. Alagilles syndrome

Correct Answer: B

26. The following represent advantages of the Rex shunt over a Warren shunt EXCEPT:

   A. Reduced bleeding from esophageal and gastric varices
   B. Reduced incidence of hepatopulmonary syndrome
   C. Improved portal venous blood flow
   D. Improved cognition
   E. Improved BMI

Correct Answer:  A

27. Indications for IR investigation of a Rex shunt include all EXCEPT:

   A. Thrombocytopenia
   B. A suspected stenosis by US, CT, or MR imaging
   C. Splenomegaly
   D. Recurrent UGI bleeding
   E. Lower extremity edema

Correct Answer:  E

References
Interesting Cases
Marta Hernanz-Schulman, MD, FACR

28. Regarding chronic or intermittent volvulus, which of the following presentations is NOT characteristic?

A. Failure to thrive
B. Malabsorption
C. Intermittent abdominal pain
D. Distal bowel obstruction

Correct Answer: D

References

29. Typical characteristics of transient small bowel intussusception include all of the following, EXCEPT:

A. Segment length < 4 cm
B. Diameter < 18 mm
C. Small lead point
D. Preserved wall motion

Correct Answer: C

References

30. Tumors occurring in patients with dysgenetic gonads include the following EXCEPT:

A. Gonadoblastoma
B. Juvenile granulosa cell tumor
C. Wilms tumor
D. Ovarian dermoid

Correct Answer: D
References

GENITOURINARY

Update on Contrast Material Use in Children
Jonathan R. Dillman, MD

31. A 15 year-old boy undergoes a CT examination with intravenous iodinated contrast material. The patient becomes unresponsive two minutes after the scan and is noted to have diffuse skin erythema. Initial vital signs confirm a blood pressure of 68/42 and a heart rate of 125. After calling for help, what is the next most appropriate step in the medical management of this patient?

A. Administer IV diphenhydramine (Benadryl) and IV corticosteroid
B. Administer inhaled β-agonist medication (e.g., albuterol)
C. Administer IV atropine
D. Administer IM epinephrine

Correct Answer: D

Reference

32. Regarding nephrogenic systemic fibrosis (NSF) in the pediatric population, which of the following is TRUE?

A. NSF has been documented mostly in children with normal renal function.
B. Patients with an estimated glomerular filtration rate (eGFR) between 45 and 60 ml/min are considered to be at-risk for NSF.
C. Macrocyclic gadolinium chelates are less likely to be associated with the development of NSF than linear gadolinium chelates.
D. Macrocyclic gadolinium chelates absolutely must be avoided in children determined to be at-risk for NSF, even if the benefits of imaging outweigh the risk of NSF.

Correct Answer: C

Reference
Update on UTI Imaging Assessment: ACR and AAP Guidelines
Boaz Karmazyn, MD

33. What is the most common acquired end stage renal disease in children in North America?

A. Renal scarring from pyelonephritis
B. Focal segmental glomerulosclerosis
C. Obstructive uropathy
D. Renal aplasia/hypoplasia/dysplasia

Correct Answer: B

References

34. What is correct about acute phase (within 2 weeks) DMSA in febrile UTI?

A. Best study to detect renal scaring
B. Accurate study in detecting dilated vesicoureteral reflux
C. Positive in 50%-60% of patients
D. Pyelonephritis most often will result in a scar

Correct Answer: C

References
Advances in Pediatric Urosonography
Kassa Darge, MD, PhD

35. The “twinkling artifact” is a color Doppler artifact that can be used to better depict stones in the urinary tract. The most conspicuous and clear visualization of the “twinkling artifact” can be best achieved by one of the following measures:

A. Switching on harmonic imaging  
B. Increasing the pulse repetition frequency (PRF) to the maximum  
C. Making the color Doppler window as small as possible  
D. Placing the focus at the level of the echogenic structure to be evaluated  
E. None of the above

Correct Answer: B

References

36. In contrast enhanced voiding urosonography, US contrast agent is administered into the bladder for detection of vesicoureteric reflux. The advantages over fluoroscopic voiding cystourethrography include the following except:

A. Elimination of radiation exposure  
B. Higher detection rate of vesicoureteric reflux  
C. Better detection of small amount of US contrast agent in a dilated ureter/pelvis  
D. No need for use of bladder catheter  
E. Improved patient comfort as it is conducted in an US room setting

Correct Answer: D

References
37. Above MRI images (T2 coronal (a), T2 axial (b), T1 fat sat axial before (c) and after contrast (d)) demonstrate a non-communicating cavitated unicornuate uterus. Which of the following is TRUE regarding a unicornuate uterus?

A. The majority of the unicornuate uterus cases are isolated without a rudimentary horn.
B. Associated renal anomalies are uncommon in unicornuate uterus.
C. A unicornuate uterus is not compatible with a viable offspring.
D. Elongation failure of one Müllerian duct which cannot reach to the urogenital sinus results in unicornuate uterus.
E. A cavitary communicating rudimentary horn does not require surgical correction.

Correct Answer: D

References


38. Which of the following statements is true?

A. Septate uterus & uterus didelphys occur due to failed lateral fusion of the Mullerian ducts.
B. Shape of the uterine fundus is the most important determinant for correct classification of a uterus with duplicated cavity.
C. Septate uterus is the least common form of Mullerian malformation.
D. Incomplete degeneration of embryologic septum results in bicornuate uterus.
E. Any uterine duplication with double cervix is in keeping with uterus didelphys.

Correct Answer: D

References

Interesting Cases
D. Gregory Bates, MD

39. The ureteral bud arises from which segment of the distal Wolffian duct?

A. MB (metanephric blastema)
B. PVP (proximal vas precursor)
C. UGS (urogenital sinus)
D. CMD (common mesonephric duct)
E. UMD (upper mesonephric duct)

Correct Answer: D

References

40. Which of the following are associated with ureteral triplication?

A. Occurs as an isolated anomaly.
B. Occurs in association with other urologic anomalies.
C. As part of the VACTERAL association.
D. Inherited as an autosomal dominant condition with amastia.
E. All of the above.

Correct Answer: E

References

41. Which of the following statements regarding renal lymphangiomatosis is incorrect?

A. Histopathologic lining of the cysts is endothelium, characterizing its vascular origin.
B. Can appear suddenly, grow rapidly, cease growth, or regress spontaneously.
C. Developmental malformation of lymphatic drainage of the renal parenchyma, renal capsule and perinephric tissues.
D. Aspiration of the cysts reveals chylous fluid.
E. Result in renin-dependent hypertension secondary to mechanical compression and compromised perfusion.

Correct Answer: D

References
42. Which are NOT subtypes of Juvenile Idiopathic Arthritis (JIA)?

A. Enthesitis-related arthritis  
B. Psoriasis  
C. Oligoarthritis  
D. Systemic arthritis  
E. CRMO

Correct Answer: E

Reference


43. Which is NOT an advantage of tridimensional ultrasound (3DUS) over conventional bi-dimensional (2DUS) imaging for assessment of arthritis?

A. Improved reliability and reproducibility in serial measurements  
B. Electronically controlled transducers: less motion artifact with the use of mechanical arms  
C. Possibility of compression of images during scanning  
D. Images in different viewing planes can be reconstructed using data acquired, including the coronal plane which is not always possible in 2DUS imaging  
E. Superior visualization of the synovial space (compared to 2DUS) including subtle changes in the microvasculature and morphology of the synovial membrane and articular cartilage

Correct Answer: C

References

44. Which is an MR imaging technique that provides estimates of the physiologic properties of the synovial microvessels in juvenile idiopathic arthritis (JIA), including blood/plasma volume, and transendothelial permeability of the contrast agent?

A. Nuclear MR (NMR) Spectroscopy
B. Dynamic MRI (positive contrast agent: gadolinium)
C. Blood oxygen level dependent (BOLD)
D. MRI (negative contrast agent: ultrasmall paramagnetic iron oxide [USPIO])
E. Diffusion-weighted imaging (DWI)

Correct Answer: B

References

Imaging of Osteochondral Lesions
J. Herman Kan, MD

45. Which of the following findings is consistently seen with normal femoral condylar irregularities and not seen with an OCD by MRI?

1. Absence of marrow edema
2. Jigsaw fragmentation of the subchondral epiphysis
3. Spherical growth plate widening
4. Trochlear cartilage location

Correct Answer: A
46. Which of the following is/are features of an unstable OCD?

A. Fluid insinuation between osteochondral lesion and parent bone  
B. Overlying cartilage thinning  
C. Loose bodies  
D. All of the above

Correct Answer: D

47. Which of the following statements regarding spinal fractures in infants and young children is FALSE?

A. The spinal fractures seen in abuse are usually compression fractures in the thoracolumbar spine.  
B. Spinal fractures are usually clinically occult and can be missed if appropriate imaging is not performed.  
C. Spinal fractures in abusive trauma are associated with other skeletal and intracranial injuries.  
D. Spine and pelvic fractures are extremely rare in child abuse.  
E. Bone scintigraphy and MRI can increase the detection of spinal fractures.

Correct Answer: D

References
B. F-18 NaF PET has similar radiation dose to 99mTc MDP but has higher resolution and multiplanar imaging.
C. Fractures can be missed if the guidelines are not followed or if the images are not of high quality.
D. The follow-up skeletal survey adds additional information in 15-60% of cases.
E. The initial and follow-up skeletal survey may be limited by not including images of the hands, feet, pelvis and spine.

Correct Answer: E

References

Imaging of Myopathies
Tal Laor, MD

49. MRI of the pelvis in boys with Duchenne muscular dystrophy is characterized by:

A. Generalized unilateral muscle involvement.
B. Hypointense T1-weighted signal in muscles from fatty replacement.
C. Hyperintense T2-weighted fat suppressed signal in muscles, reflecting edema and/or inflammation.
D. Relative sparing of the gluteus maximus muscles.

Correct Answer: C

References

50. Fat signal in muscle on MRI is characteristic of:

A. Acute rhabdomyolysis
B. Chronic denervation
C. Delayed onset muscle soreness (DOMS)
D. Pyomyositis

Correct Answer: B

References

Interesting Cases
Mary B. Wyers, MD

51. What is the most likely etiology of this finger lesion?

A. Ganglion cyst
B. Hemangioma
C. Bursitis
D. Giant cell tumor
E. Rhabdomyosarcoma

Correct Answer: D

References

52. Which of these may be associated with this anomaly?
A. Congenital vertical talus
B. Tibial hypoplasia
C. Ddh
D. Polydactyly

Correct Answer: B

References

53. What is the etiology of these findings?

A. Infection/osteomyelitis
B. Pathologic physeal bar
C. Stress
D. Something strange and rheumatologic

Correct Answer: C

References
1. Zbojniewicz a, laor t. Focal periphyseal edema (fope) zone on mri of the adolescent knee:

ONCOLOGY IMAGING

Late Effects of Cancer Treatment
Kirsten K. Ness, PhD

54. A 35 year old survivor of childhood onset Hodgkin Lymphoma who was treated with 30 Gy mantle field radiation to the chest as part of her cancer therapy when she was 12 years of age and whose ovaries were not in the radiation field is:

A. Not at an elevated risk for breast cancer because her ovaries were not treated with radiation
B. Does not have an elevated risk of breast cancer compared to other 40 year old females
C. Not at risk for thyroid cancer because the dose of radiation was too high
D. At a higher risk for thyroid than for breast cancer
E. At risk for both thyroid and breast cancer

Correct Answer: E

References

55. A 45 year old survivor of childhood onset Hodgkin Lymphoma who was treated with 30 Gy mantle field radiation to the chest as part of his cancer therapy when he was 14 years of age is:

A. At an elevated risk of heart valve disease when compared to other cancer survivors who did not receive radiation
B. Does not have an elevated risk of cognitive impairment when compared to population normative values
C. Not at risk for thyroid cancer because the dose of radiation was too high
D. Not at risk for lung problems
E. Not at risk for skin cancer

Correct Answer: A

References

Pre and Post-operative Imaging of Limb Salvage Therapy
Laura M. Fayad, MD

56. Which of the following statements regarding limb salvage surgery are correct:

A. Amputation is an extreme form of limb salvage surgery.
B. Autografts are ideally used for a large resection
C. Allografts, although readily available, are prone to complications of fracture, infection and nonunion.
D. Intercalary segmental allografts are used for resection and reconstruction of the end of bone (epiphysis).
E. Endoprostheses provide tendinous attachments for reconstructions of the shoulder, knee and hip, and are therefore, less prone to instability than other reconstruction options.

Correct Answer: C

References

57. **CT imaging of the patient who has undergone limb salvage surgery offers the following:**

   A. Metal reduction techniques with CT are usually effective at reducing streak artifact associated with metal hardware.
   B. CT offers superior contrast resolution to MRI for the assessment of the postoperative patient.
   C. 3D CT is ineffective at displaying implanted metal.
   D. CT, although advantageous for the assessment of the osseous structures, is very insensitive to recurrent disease.

   **Correct Answer:** A

**References**


**Detection of CNS Metastases**

*Noah Sabin, MD, JD*

58. **Which of the following statements is incorrect concerning methods of detecting metastatic lesions in the brain and spine of a child?**

   A. CISS imaging and the “fill in the gap” technique can help distinguish small spinal leptomeningeal metastases from blood vessels.
   B. Diffusion-weighted imaging is especially useful for detection of nonenhancing hypercellular metastases in or along the brain.
   C. The technique of subtracting precontrast T1-weighted images from postcontrast T1-weighted images may help detect small enhancing metastatic lesions in the brain as well as perineural tumor spread and infiltrating tumor.
   D. Post gadolinium FLAIR images may help visualize intracranial leptomeningeal metastases by highlighting the T2 shortening properties of gadolinium.
   E. Motion can cause artifactual hyperintensity that can be confused for enhancement on subtraction images.

   **Correct Answer:** D
References


6. Ramli N, Cooper A, Jaspan T. High resolution CISS imaging of the spine. *Br J Radiol* Sep 2001;74:862-873. (This article does not discuss the use of CISS for detection of metastases but does provide a good overview of the use of the imaging sequence.)

59. Which of the following statements is correct concerning leptomeningeal metastases in children?

A. Tumor may only reach the CSF by erosion through pia or dura mater or by seeding of the CSF during a surgical procedure.

B. On post gadolinium MR imaging, leptomeningeal metastases may appear as diffuse linear enhancement or enhancing nodules but never as a combination of linear and nodular enhancement.

C. MRI techniques are now so sensitive for the detection of leptomeningeal metastases that CSF cytology is no longer routinely needed.

D. If no abnormal intracranial enhancement is detected on an MRI examination of the brain or spine, leptomeningeal metastases can be confidently ruled out.

E. The differential diagnosis for MRI findings compatible with leptomeningeal metastases includes meningitis, viral encephalitis and recent intracranial surgery.

Correct Answer: E

References


60. Regarding MR based attenuation correction of PET data, which of the following is TRUE?

A. MR based attenuation correction is required for both sequential and simultaneous PET-MR scanners
B. MR provides improved attenuation correction of bone compared to PET-CT
C. MR provides improved attenuation correction of metal compared to PET-CT
D. Current evidence suggests good correlation between PET-MR and PET-CT estimated SUVs

Correct Answer: D

61. Which of the following statements regarding hybrid PET-MR imaging is TRUE?

A. MR acquisition is truly simultaneous with PET acquisition.
B. PET-MR is as sensitive as CT in detecting <1cm pulmonary metastasis
C. Radiation exposure from PET-MR is not significantly different as compared to PET-CT
D. Hybrid systems use low strength magnets which can only be used for anatomic localization

Correct Answer: A

References