

SPR 2010 Postgraduate Course
Imaging Challenges and Clinical Perspectives in Pediatric Radiology
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LIVER IMAGING

MRI of the Liver: How to Do It
Shreyas S. Vasanawala, MD, PhD

Which of the following changes in pulse sequence parameters minimizes flow-related dephasing when evaluating hepatic vasculature with contrast-enhanced MRA?

- A. Increase flip angle
- B. Decrease bandwidth
- C. Employ z-interpolation
- D. Employ functional echo
- E. Employ partial phase field of view

Reference

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Cross-sectional Imaging of Pediatric Biliary Disorders
Kathleen H. Emery, MD

Which of the following statements about choledochal cysts is NOT true?

- A. The Todani classification system divides bile duct cysts into five major subtypes.
- B. Cystic biliary atresia is considered a choledochal cyst and is treated the same.
- C. The “common channel theory” is the accepted explanation for Type 1 choledochal cysts.
- D. Surgical excision is the accepted treatment to avoid the risk of cholangiocarcinoma.
- E. Type 5 (Caroli’s disease) is best explained by the ductal plate malformation theory.

References

1. Todani T, Watanabe Y, Narusue M, Tabuchi K, Okajima K. Congenital bile duct cysts: Classification, operative procedures, and review of thirty-seven cases including cancer arising from choledochal cyst. *Am J Surg.* Aug 1977;134(2):263-269.
2. Okada T, Sasaki F, Ueki S, Hirokata G, Okuyama K, Cho K, et al. Postnatal management for prenatally diagnosed choledochal cysts. *J Pediatr Surg.* Jul 2004;39(7):1055-1058.
3. Caponcelli E, Knisely AS, Davenport M. Cystic biliary atresia: an etiologic and prognostic subgroup. *J Pediatr Surg.* Sep 2008;43(9):1619-1624.

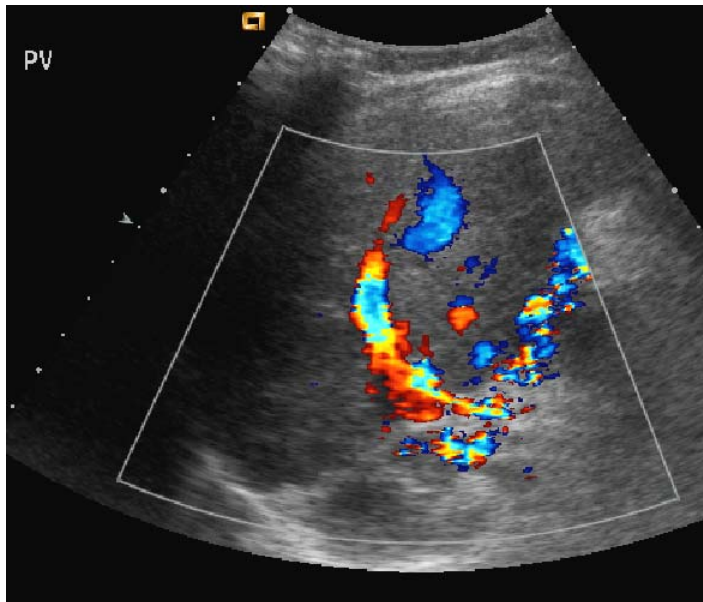
4. Yamashiro Y, Miyano T, Suruga K, Shimomura H, Suda K, Matsumoto M, et al. Experimental study of the pathogenesis of choledochal cyst and pancreatitis, with special reference to the role of bile acids and pancreatic enzymes in the anomalous choledocho-pancreatico ductal junction. *J Pediatr Gastroenterol Nutr.* Nov 1984;3(5):721-727.
5. Jorgensen MJ. The ductal plate malformation. *Acta Pathol Microbiol Scand Suppl.* Jan 1977(257):1-87.

Imaging Liver Transplantation

Paul S. Babyn, MD

You are shown an ultrasound image (Figure 1) of a child with reduced liver transplant now presenting with elevated liver function tests and gastrointestinal bleeding. Which of the following sonographic features can be commonly seen in the illustrated vascular complication?

- A. Narrowing of the portal vein to less than 3.5 mm
- B. Focal color aliasing with a 3-4 fold increase in velocity
- C. Poststenotic dilation
- D. Hepatic arterial prolonged acceleration time and elevated velocity >2 m/sec
- E. Answers A, B and C



References

1. Zamboni GA, Pedrosa I, Kruskal JB et al. *Multimodality postoperative imaging of liver transplantation.* *Eur Radiol* 2008;18:882-891
2. Suzuki L, De Oliveira I, Widman A et al. *Realtime and Doppler US after pediatric segmental liver transplantation. 1 Portal vein stenosis.* *Pediatr Radiol* 2008; 38; 403-408

MUSCULOSKELETAL: THE LARGE JOINTS

MRI of the Knee: Key Points in the Pediatric Population

Peter J. Strouse, MD

The “double posterior cruciate ligament” sign occurs due to injury of which of the following structures?

- A. Anterior cruciate ligament
- B. Posterior cruciate ligament
- C. Medial meniscus
- D. Lateral meniscus

References

1. Dorsay TA, Helms TA. Bucket-handle meniscal tears of the knee: sensitivity and specificity of MRI signs. *Skeletal Radiol* 2003;32:266-272
2. Wright DH, De Smet AA, Norris M. Bucket-handle tears of the medial and lateral menisci of the knee: value of MR imaging in detecting displaced fragments. *AJR Am J Roentgenol* 1995;165:621-625
3. Ververidis AN, Verettas DA, Kazakos KJ, et al. Meniscal bucket handle tears: a retrospective study of arthroscopy and the relation to MRI. 2006;14:343-349
4. Venkatanarasimha N, Kamath A, Mukherjee, Kamath S. Potential pitfalls of a double PCL sign. *Skeletal Radiol* 2009;38:735-739

Shoulder Pain in the Adolescent Athlete: A Multidisciplinary Diagnostic Approach From the Medical, Surgical and Imaging Perspectives

Kelley W. Marshall, M.D.

Which one of the following would NOT be an expected finding in an athlete with internal shoulder impingement?

- A. Superior labral degeneration or SLAP tears
- B. Greater tuberosity cyst
- C. Bankhart lesion
- D. Tendinosis of the supraspinatus and infraspinatus
- E. Long head biceps tendinosis

Reference

Tuite M, Petersen B, Wise S, Fine J, Kaplan L, Orwin J (2007) Shoulder MR arthrography of the posterior labrocapsular complex in overhead throwers with pathologic internal impingement and internal rotation deficit. *Skeletal Radiol* 36:495-502

Hip and Groin Pain in Adolescents

Tal Laor, MD

MR arthrography of the hip is commonly used in evaluation of adolescents with hip or groin pain. The most common indications include:

- A. Snapping iliopsoas tendon and associated bursitis
- B. Delineation of a rectus abdominus-adductor aponeurosis tear
- C. Femoroacetabular impingement following a slipped capital femoral epiphysis
- D. Evaluation of disease activity of juvenile idiopathic arthritis

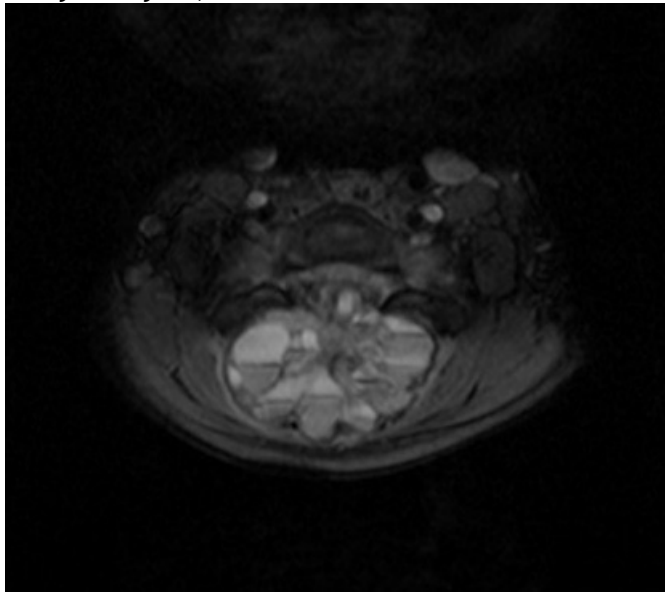
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1. Kassarian A, Brisson M, Palmer WE. Femoroacetabular impingement. *Eur J Radiol* 2007;63:29-35.
2. Argyropoulou MI, Fanis SL, Xenakis T, Efremidis SC, Siamopoulou A. The role of MRI in the evaluation of hip joint disease in clinical subtypes of juvenile idiopathic arthritis. *Br J Radiol* 2002;75:229-33.

MUSCULOSKELETAL: CLINICAL, IMAGING AND IR CHALLENGES

Evaluation of Pediatric Bone Lesions

Mary R. Wyers, MD



What feature of this lesion is MOST indicative of a benign etiology?

- A. The fluid-fluid levels comprise less than 1/3 of the entire lesion
- B. The components of the fluid, which are best evaluated on the T2 weighted images
- C. The fluid-fluid levels comprise the majority (greater than 2/3) of the entire lesion
- D. There is no significant periosteal reaction
- E. All of the above

References

1. Van Dyck P, Vanhoenacker FM, Vogel J et al (2006) Prevalence, extension and characteristics of fluid-fluid levels in bone and soft tissue tumors. *Eur Radiol* 16:2644-2651
2. O'Donnell P, Saifuddin A (2004) The prevalence and diagnostic significance of fluid-fluid levels in focal lesions of bone. *Skeletal Radiol* 33:330-336

IR challenges in the MSK system

Neil D. Johnson, MBBS

Which of the following has been proposed as a pathogenesis of Primary Aneurysmal Bone Cyst in Children?

- A. Post Traumatic Reactive Lesion
- B. Intraosseous Vascular Malformation
- C. Primary Benign Bone Tumor
- D. a and c
- E. a, b and c

Reference

1. Cottalorda, J. Bourelle, S. Modern concepts of primary aneurysmal bone cyst. *Arch Orthop Trauma Surg* (2007) 127:105-114

Percutaneous treatment of aneurysmal bone cyst by embolization or direct sclerosis may result in which described complications?

- A. Stroke and/or Death
- B. pulmonary embolism
- C. fracture
- D. life threatening hemorrhage
- E. all of the above

Reference

1. Pernaud, A. Drake, JM et al Fatal ethibloc embolization of vertebrobasilar system following percutaneous injection into aneurysmal bone cyst of the second cervical vertebra; *AJNR Am J Neuroradiology* (2004) 25: 1116-1120

NEUROIMAGING

Cervical spine injuries in pediatrics: are children small adults or not?

Joseph J. Junewick, MD

Select the correct statement(s) regarding cervicocranial injuries in pediatric patients without fracture on conventional radiographs or CT:

- a) occult cervicocranial injuries are more common in younger children compared to older children
- b) the subdental synchondrosis may predispose to type II odontoid fractures
- c) cervical extra-axial hemorrhage is commonly seen in child abuse
- d) patients with type II collagenopathies are susceptible to atlanto-axial instability
- e) pseudosubluxation is most common at C2-C3

References

1. Junewick JJ, Meesa IR, Luttenton CR et al. Occult injury of the pediatric craniocervical junction. *Emerg Radiol* (2009); 16:483-488.
2. Gebauer M, Lohse C, Barvencik F, et al. Subdental synchondrosis and the anatomy of the axis in aging: A histomorphometric study in 30 autopsy cases. *Eur Spine J* (2006); 4(3):292-298.
3. Hadley M, Sonntag V, ReKate H et al. The infant whiplash-shake syndrome: A clinical and pathological study. *Neurosurg* (1989); 24:536-539.
4. Lachman RS. The cervical spine in skeletal dysplasias and associated disorders. *Pediatric Radiol* (1997); 27:402-408.
5. Cattell HS and Filtzer DL. Pseudosubluxation and other normal variations in the cervical spine in children: A study of 160 children. *JBJS* (1965); 47:1295-1309.

Imaging of Head and Neck Neoplasms in Children

Caroline D. Robson

What is the most frequently encountered life-threatening complication of neonatal teratoma?

- A. Hemorrhage with consumptive coagulopathy
- B. Airway compromise
- C. Hypothyroidism
- D. Infection
- E. Metastatic disease

References

1. Martino, F., L. F. Avila, et al. (2006). "Teratomas of the neck and mediastinum in children." *Pediatr Surg Int* 22(8): 627-34.
2. Mulliken, J. B., S. J. Fishman, et al. (2000). "Vascular anomalies." *Curr Probl Surg* 37(8): 517-84.