

**Musculoskeletal  
General Postgraduate Course - May 15, 2018  
SAM References**

**Adolescent Hip Imaging**

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1. **Which lateral radiographic view of the hip is the most sensitive for detection of cam-type deformities of the femoral head/neck junction?**
  - A. Cross-table
  - B. Frog-leg
  - C. 45° Dunn
  - D. False Profile

**Correct Answer: C**

**Rationale:** Answer A is incorrect: The cross-table lateral radiograph delineates the anterior femoral head/neck junction (3:00 position) to best advantage, while most cam deformities are located more superiorly (between 1:00-2:00). Answer B is incorrect: While the frog-leg lateral view is considered an acceptable screening radiograph, it is not as sensitive for detecting cam-type deformities as the Dunn lateral radiograph. Answer D is incorrect: The false profile radiograph is a standing lateral view of the acetabulum. The femoral neck is obscured by the greater trochanter and not well visualized.

**References:**

- Clin Orthop Relat Res 2012;470(12):3313-20.
- Saito M, Tsukada S, Yoshida K, Okada Y, Tasaki A. Correlation of alpha angle between various radiographic projections and radial magnetic resonance imaging for cam deformity in femoral head-neck junction. Knee Surg Sports Traumatol Arthrosc 2017; 25:77-83.
- Hipfl C, Titz M, Chiari C, Schöpf V, Kainberger F, Windhager R, Domayer S. Detecting cam-type deformities on plain radiographs: what is the optimal lateral view? Arch Orthop Trauma Surg 2017;137:1699-1705.

2. **On an AP pelvic radiograph, acetabular inclination can be best assessed by which measurement?**
  - A. Tonnis angle
  - B. Lateral center edge angle
  - C. Alpha angle
  - D. Anterior center edge angle

**Correct Answer: A**

**Rationale:** On an AP pelvic radiograph, acetabular inclination can be best assessed by the Tonnis angle. On an AP pelvis view, the Tonnis angle is formed from a line drawn along the horizontal and a line extending through the lateral margin of the acetabular sourcil.

**References:**

- Tannast M, Siebenrock KA, Anderson SE. Femoroacetabular impingement: radiographic diagnosis – what the radiologist should know. AJR 2007; 188: 1540-1552.
- Clohisy JC, Carlisle JC, Beaulé PE, Kim YJ, Trousdale RT, Sierra RJ, Leunig M, Schoenecker PL, Millis MB. A systematic approach to the plain radiographic evaluation of the young adult hip. JBJS 2008; 90A(4): 47 – 66.

## Imaging of Knee Cartilage

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### 3. Which of the following best describes the relative absolute T2 values of articular cartilage vs. physeal cartilage?

- A. Articular cartilage > physeal cartilage
- B. Articular cartilage = physeal cartilage
- C. Physeal cartilage > articular cartilage
- D. The T2 value of articular cartilage is not known

#### Correct Answer: C

**Rationale:** Mean T2 relaxation times of cartilage have been shown to be longer when there is an open physis compared to a closed physis due to the contribution of the physeal cartilage. The mean value of T2 relaxation time of cartilage is in part related to water content and inversely related to proteoglycan content.

#### References:

- Mosher TJ, Dardzinski BJ. Cartilage MRI T2 relaxation time mapping: overview and applications. *Semin Musculoskelet Radiol.* 2004 Dec;8(4):355-68.
- Shiraj S, Kim HK, Anton C, Horn PS, Laor T. Spatial variation of T2 relaxation times of patellar cartilage and physeal patency: an in vivo study in children and young adults. *AJR Am J Roentgenol.* 2014 Mar;202(3):W292-7.

### 4. Which sequence is the best for evaluating the anatomic morphology of articular cartilage?

- A. T1-Weighted
- B. DESS (double-echo steady state)
- C. Ultralong TE sequences
- D. SSFSE (single shot fast spin echo)

#### Correct Answer: B

**Rationale:** DESS (double-echo steady state) has good contrast between cartilage and joint fluid and other soft tissue structures. The sequence can be used to measure morphological features of cartilage including thickness. DESS can have shorter imaging times and higher signal-to-noise compared to standard 3D SPGR (spoiled gradient-recalled echo) sequences.

#### References:

- Crema MD, Roemer FW, Marra MD, Burstein D, Gold GE, Eckstein F, Baum T, Mosher TJ, Carrino JA, Guermazi A. Articular cartilage in the knee: current MR imaging techniques and applications in clinical practice and research. *Radiographics.* 2011 Jan-Feb;31(1):37-61.
- Ho-Fung VM, Jaramillo D. Cartilage imaging in children: current indications, magnetic resonance imaging techniques, and imaging findings. *Radiol Clin North Am.* 2013 Jul;51(4):689-702.

## Ultrasound of Painful Joints

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### 5. Which of the following is TRUE regarding the “swelling ratio” for the US diagnosis of ulnar neuropathy in children, women, or obese patients? (please select all that apply)

- A. Includes the maximal diameter of the nerve
- B. Requires the maximal cross sectional area of the nerve
- C. Measurements made at the mid and distal humerus
- D. Includes a correction factor for variations in nerve size

**Correct Answer: B & C**

**Rationale:** Due to variability in nerve size in these populations, a swelling ratio > 1.5:1 using the maximal cross sectional area of the nerve at two distinct levels (mid humerus and around the medial epicondyle) can be useful in addition to or in place of a maximal cross sectional area.

**Reference:**

- Zbojniewicz AM. US for diagnosis of musculoskeletal conditions in the young athlete: emphasis on dynamic assessment. Radiographics. 2014 Sep-Oct;34(5):1145-62. doi: 10.1148/rg.345130151.

6. **An ultrasound is performed for medial elbow pain and snapping and demonstrates a dislocating ulnar nerve in conjunction with a dislocating medial triceps. Choose the correct statement:**

- A. This is a common normal variant that is typically painless
- B. These findings are always associated with ulnar neuropathy
- C. Symptoms relieved by resecting the medial triceps
- D. Simply corrected by transposing the ulnar nerve alone

**Correct Answer: C**

**Rationale:** Surgical excision of a portion of the medial head triceps alone may be all that is required depending on the patients' clinical presentation.

**Reference:**

- Zbojniewicz AM. US for diagnosis of musculoskeletal conditions in the young athlete: emphasis on dynamic assessment. Radiographics. 2014 Sep-Oct;34(5):1145-62. doi: 10.1148/rg.345130151.

## Throwing Adolescent Athlete

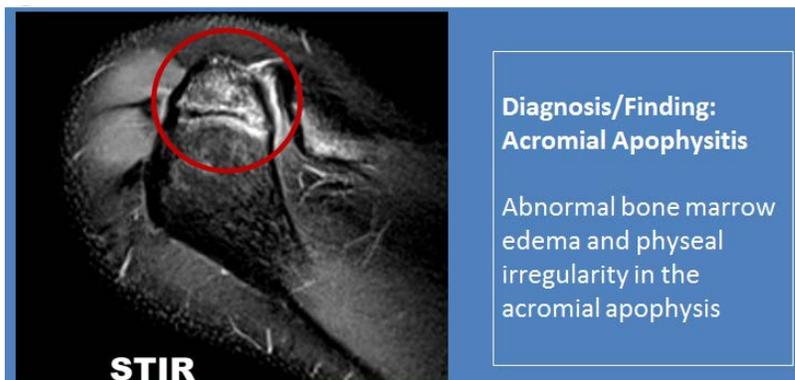
*Arthur B. Meyers, MD*

*Victor M. Ho-Fung, MD*

7. **What is the most likely diagnosis?**

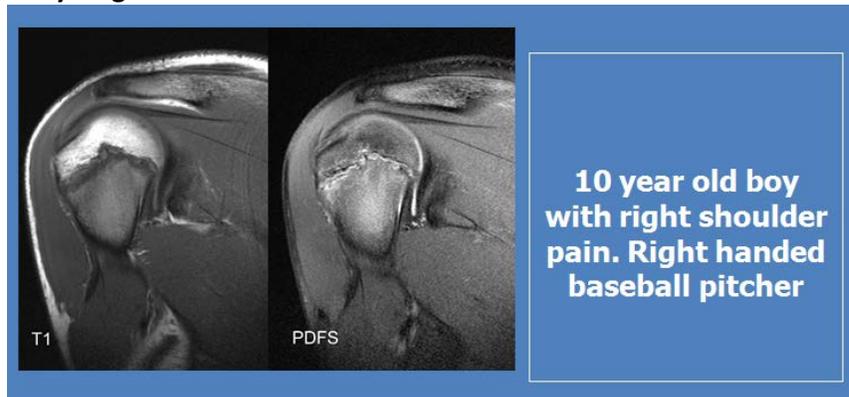


**Correct Answer:** Acromial apophysitis – Abnormal bone marrow edema and physeal irregularity in the acromial apophysis.

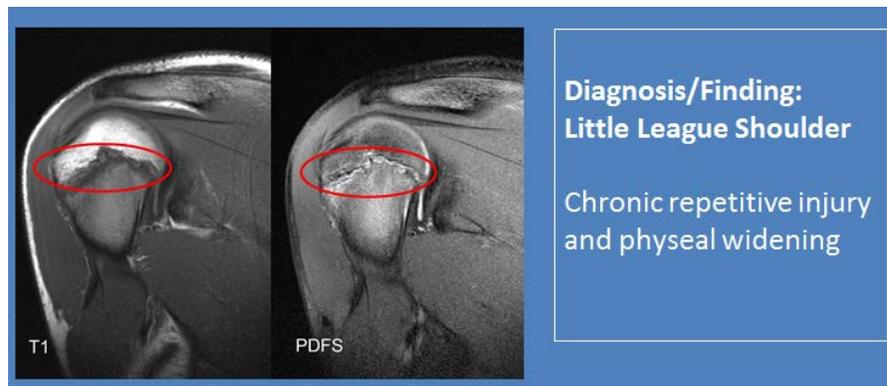


**Reference:** Delgado J, Jaramillo D, Chauvin NA. Imaging the Injured Pediatric Athlete: Upper Extremity. Radiographics. 2016;36(6):1672-87.

**8. What is the most likely diagnosis?**



**Correct Answer:** Little league shoulder – Chronic repetitive injury and physeal widening



**Reference:** Delgado J, Jaramillo D, Chauvin NA. Imaging the Injured Pediatric Athlete: Upper Extremity. Radiographics. 2016;36(6):1672-87.