Lesson 6: The “CHAFT” Mnemonic for Musculoskeletal Lesions With Low T2 Signal Intensity
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Question 6-1. This question draws attention to the site most commonly affected by pigmented villonodular synovitis, which is the knee joint (B); but pigmented villonodular synovitis can occur in any joint as a benign synovial neoplastic process, mostly affecting young to middle-aged adults. So (B) is the correct answer.

Question 6-2. This question concerns several important statements about synovial osteochondromatosis. Synovial osteochondromatosis may be primary or secondary; the former type is caused by metaplasia of the synovium producing multiple intra-articular chondral bodies of similar, not variable (C), size and not caused by trauma (A); whereas the secondary type may be caused by either trauma or osteoarthritis (B). So (A) and (C) are false, but (B) is true. The most commonly involved joint is the knee, followed by the hip and shoulder, and not the wrist (E). Thus (E) is false. When calcified, the intra-articular chondral bodies are low, not high (D), signal intensity on T2 MRI. So (D) is false. Since (B) is true, (B) is the correct answer.

Question 6-3. This question refers to patients who are at risk to develop amyloid arthropathy. Amyloid arthropathy occurs typically in large joints in patients who have undergone long-term dialysis (B). So (B) is the correct answer.

Question 6-4. This question concerns MR features of schwannomas, which are peripheral nerve sheath tumors, also called neurilemomas. Schwannomas are fusiform in shape (A) with well-, not poorly (B), defined borders. So (A) is true, but (B) is false. On T2 sequences, low signal intensity centrally (Antoni A region) (D) and high signal intensity peripherally (Antoni B region) (E) produce a targetoid appearance (C) of these tumors. Thus (C), (D), and (E) are true. Since (B) is false and the exception, (B) is the correct answer.

Question 6-5. This question highlights a mnemonic that will help the radiologist to recall the 5 general categories of musculoskeletal lesions that contain low T2 MR signal intensity. The specific mnemonic is “CHAFT,” which stands for soft tissue masses containing Calcifications, Hemosiderin, Air or Amyloid deposition, Fibrous lesions, and Tophi (A). So (A) is the correct answer.
Question 6-6. This question emphasizes the MR physics of the production of low T2 signal intensity in soft tissue lesions. Causes of low T2 signal intensity include low mobile hydrogen proton density (e.g., calcium and gas) (A), fast-moving blood (e.g., vascular lesions) (B), large amount of collagen and low cellularity and water content (C) producing low quantity of mobile hydrogen protons (e.g., fibrous lesions), and strong paramagnetic properties causing rapid dephasing of hydrogen proton spins (e.g., iron, other metals, and gadolinium) (D). Since (A), (B), (C), and (D) are true; (E), all of the above, is the correct answer.

Question 6-7. This question represents a diagnostic radiologic problem in which the MR examination of a 16-year-old boy with chronic knee pain shows low T2 signal foci within the joint, advanced joint destruction, and hypertrophied epiphyses. All of the options provided (i.e., hemophilic arthropathy [A], pigmented villonodular synovitis [B], primary synovial osteochondromatosis [C], and amyloid arthropathy [D]) can cause low T2 signal foci within the joint. However, pigmented villonodular synovitis (B) and primary synovial osteochondromatosis (C) would be unlikely to cause advanced joint destruction and hypertrophied epiphyses. So (B) and (C) are unlikely. Amyloid arthropathy (D) would be unusual in a 16-year-old boy since it is usually due to long-term dialysis. Although amyloid arthropathy can cause joint destruction, it would be unusual to cause hypertrophied epiphyses. Thus (D) is unlikely. However, hemophilic arthropathy (A) can lead to all of the clinical and imaging findings in this patient. Therefore, hemophilic arthropathy (A) is the most likely diagnosis, and (A) is the correct answer.

Question 6-8. This question addresses the surgical procedure on the knee responsible for the cyclops lesion, which is anterior cruciate ligament (ACL) reconstruction (D). The cyclops lesion is a round form of arthrofibrosis that occurs just anterior to the ACL graft in Hoffa fat pad. Recently, the cyclops lesion has been reported in patients with just ACL injury without previous ACL reconstruction. The MR characteristics of the cyclops lesion is a heterogeneous T2 signal intensity mass anterior to the native or graft ACL, measuring up to 15 mm in size. The Editor was unaware of the cyclops lesion and thought our readership should be aware of it, since today ACL reconstruction is a common orthopaedic procedure.

Question 6-9. This question calls attention to a clinical vignette in which a 15-year-old boy presents with a painless soft tissue mass about the elbow. The mass contains phleboliths on plain radiographs and punctate foci of low T2 signal on MRI. All of the options (i.e., tophaceous gout [A], primary synovial osteochondromatosis [B], hemangioma [C], fibromatosis [D], and schwannoma [E]) can present as a soft tissue mass about the elbow; but of these options, only a hemangioma (C) contains phleboliths on radiographs. In this young boy, the confirmation of phleboliths in the mass on plain radiography helps to narrow the diagnosis to hemangioma. So (C) is the correct answer.

Question 6-10. This question alludes to the most common site of hydroxyapatite deposition disease, which is the shoulder (C). The hip (A) and elbow (B), in decreasing order of frequency, are other joints commonly affected by hydroxyapatite deposition disease. So (C) is the correct answer.

Answer Key for Volume 35 # 6:
1. B
2. B
3. B
4. B
5. A
6. E
7. A
8. D
9. C
10. C