

Specialty Area: Challenges in Musculoskeletal Imaging, Saturday, 20 April, 2013

Bone Marrow Edema: Injury Patterns

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Highlights (Objectives/ Purpose):

Recognize difference in acute bone marrow edema vis-à-vis chronic signal changes that may represent reactive changes

Identify classic mechanisms of acute injury based upon characteristic bone marrow patterns as well as their associated soft tissue lesions

Bone marrow patterns encountered in the setting of more chronic injury

Target audience:

Practicing radiologists, radiologists in training, radiology technologists

Discussion:

As has been pointed out in the literature, and encountered in clinical practice on a daily basis, marrow signal alterations are characterized by low signal intensity on T1-weighted images, and increased signal on T2- or proton density-weighted fat-suppressed FSE images. Subchondral marrow changes can be encountered in a variety of processes including acute trauma, chronic repetitive microtrauma, degenerative changes of OA, with idiopathic entities, osteonecrosis, inflammation, or tumor. In more chronic processes, such as with OA, histopathologic analysis suggests that signal alteration represents changes including necrosis, fibrosis and alteration of trabecular bone—but little true edema. In the setting of trauma, the bone marrow lesion represents edema and hemorrhage and correlates with the footprint of the injury.

This lecture will emphasize classic bone marrow edema patterns seen in the setting of acute trauma, along with associated soft tissue lesions:

- ACL injury
- Hyperextension injury
- Valgus force at the knee
- Patellar dislocation
- Anterior versus posterior dislocation in the shoulder

It will emphasize altered bone marrow signal seen outside the setting of acute trauma:

- Ulnar impaction syndrome
- Insufficiency fracture (SONK)
- Overuse phenomenon pediatric patient population
- Friction syndromes (PTT at medial malleolus/ 1st extensor compartment wrist)
- Valgus extension overload elbow in pediatric population

References:

1. Zanetti, et al., Bone marrow edema patterns in osteoarthritic knees: correlation between MR imaging and histologic findings. *Radiology* 2000; 215(3): 835-840.
2. Kozoriz, et al., Evaluating bone marrow oedema patterns in musculoskeletal injury. *Br J Sports Med* 2012; 46: 946-953.
3. Karantanas, et al., Acute non-traumatic marrow edema syndrome in the knee: MRI findings at presentation, correlation with spinal DEXA and outcome. *Eur J Radiol* 2008; 67: 22-33.