

## **94. Osseous/Cartilaginous Ankle Disorders**

Osteochondral lesions of the talus may arise as a result of direct injury or repetitive microtrauma. Figure 94.1A is an example of such a lesion with a displaced fragment clearly seen within the posterosuperior aspect of the posterior subtalar facet on sagittal FS T2WI. Homogenous hyperintensity within the calcaneus and talus correlates with associated bone contusion (better appreciated as hypointensity on T1WI). Talar osteochondral lesions are divided into five categories by the MR criteria devised by Hepple. Stage 1 lesions are radiographically occult, consisting of damage to only the articular cartilage. Concomitant cartilaginous and osseous fractures with and without edema comprise Stage 2A and 2B lesions, respectively. A detached but non-displaced fragment is seen in stage 3, while fragment displacement constitutes a stage 4 lesion. Stage 5 lesions are marked by subchondral cyst formation. Figure 94.1B,C demonstrates an osteochondral lesion within the posteromedial talus. Inferior and superior portions of the medial cortical surface are disrupted on both coronal (B) T1 and (C) FS T2WI. Superiorly, formation of a subchondral cyst is best appreciated on (C) FS T2WI, consistent with a grade 5 lesion. Edema—hypo- and hyperintense on the T1 and FS T2WI respectively—is seen throughout the talus. In the midst of this edema on the (C) FS T2WI there is a smaller focus of hypointensity. While such areas often represent reactive sclerosis, here the hypointensity correlated with an area of necrotic bone associated with AVN. AVN most frequently involves the talar dome, the typical appearance consisting of a low SI ischemic foci surrounded by hyperintense (on FS images) marrow edema. Chronically, the surrounding edema resolves with the osteonecrotic focus persisting. More diffusely infarcted bone often exhibits serpiginous hypointensity on T1WI. Edema in AVN is more prominent compared to that typically seen in osteochondral lesions. The latter lesions tend to exhibit edema emanating to a more localized area around the lesion. The typical pattern of an osteochondral lesion is exhibited in the sagittal T1 and FS T2WI of Fig. 94.1D,E: patchy hyperintensity on (E) FS T2WI extends peripherally from an osteochondral defect seen along the lateral surface of the talar dome. Cortical disruption is again seen along the articular surface with accompanying subchondral cyst formation—demonstrating high SI on (E) FS T2 and low SI on (D) T1WI—denoting a Stage 5 lesion. Contrast-enhanced MR aids in detecting viable (enhancing) bone fragments, hypertrophic synovium, and subchondral edema. MR arthrography directly identifies detached fragments: contrast (or synovial fluid in non-enhanced MR) extending completely beneath an osteochondral fragment, for example, indicates the presence of a detached Stage 3 lesion, while irregular, incomplete hyperintensity suggests a Stage 2 lesion. Unfortunately, nearby hyperintense or enhancing granulation tissue (indicative of healing) may mimic the

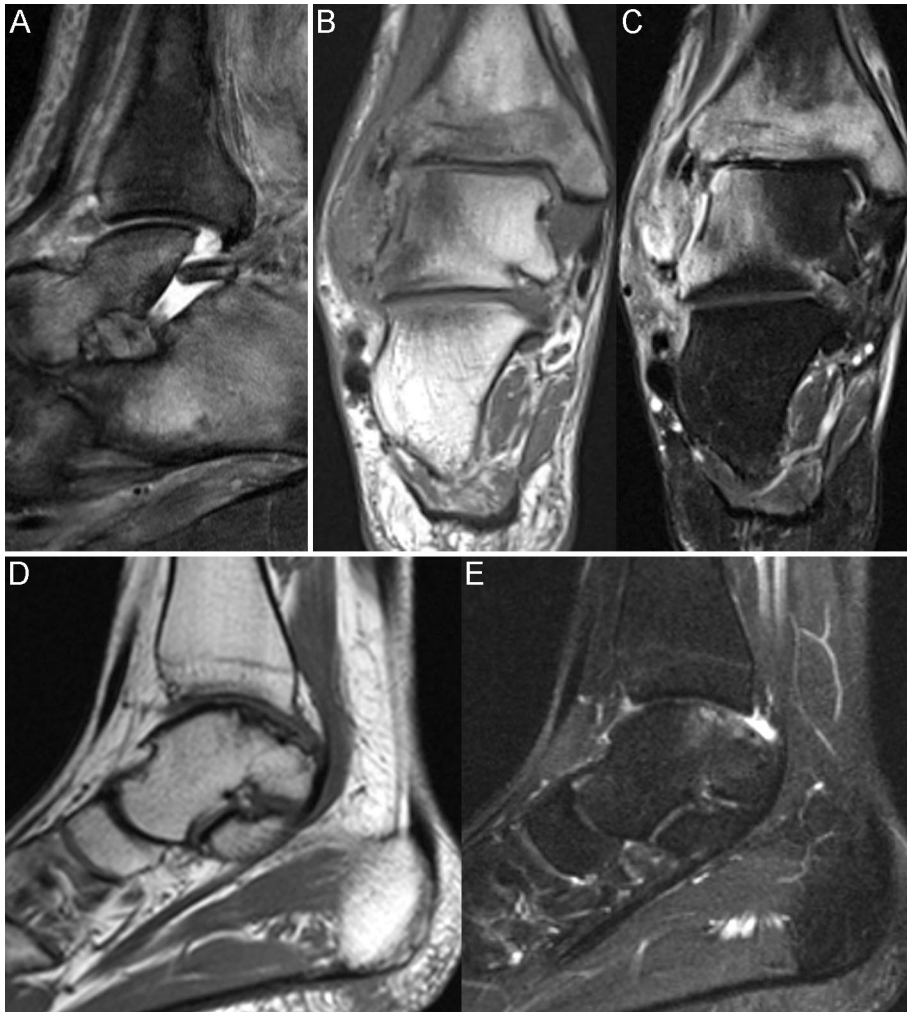


Fig. 94.1

appearance of underlying joint fluid or contrast, respectively. Underlying hypointensity is more specific for healing. In this figure, the articular cartilage of the talus, typically of moderate SI on T1 and T2WI, also demonstrates irregularity and hyperintensity on (E) FS T2WI. Other cartilaginous abnormalities include structural deformity, bowing, or joint fluid infiltrating within or beneath.

An assortment of other abnormalities may affect the foot and ankle. Freiberg's infarction—osteonecrosis of the 2<sup>nd</sup> metatarsal head—is best visualized on sagittal MRI, demonstrating subchondral marrow edema on FS T2WI and flattening of the anterosuperior aspect of the metatarsal head. Osteochondrosis of the navicular is termed Kohler's disease. Stress fractures are detected earlier on MRI than on conventional radiography with SI changes that are similar to that of bone contusions (described above), consisting of edema-like SI surrounding an irregular hypointense fracture line, although the latter is not uniformly identified. Various named fractures of the distal tibia and fibula appear similar. Also on the

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differential for diffuse marrow edema is migratory osteoporosis, distinguishable only by its transience. Diabetic arthropathy and osteomyelitis appear similar. Surrounding cellulitis, sinus tracts, and abscesses typify the latter, whereas the former tends to fragment bone and lack overlying ulcers. Both are accompanied by marrow enhancement and joint effusions. Neuropathic joints, in distinction, affect multiple joints and are typified by a lack of pure edema SI, often demonstrating low SI on both T1 and T2WI. Morton's neuroma describes a complex comprised by nonneoplastic, painful fibrosis around an interdigital nerve. On MRI it presents as a dumbbell-shaped mass most commonly in the 3<sup>rd</sup> intermetatarsal space (between the 3<sup>rd</sup> and 4<sup>th</sup> metatarsal heads). This lesion exhibits moderate SI on conventional MRI and variable enhancement. In distinction, true neuromas are typically hyperintense on T2WI. Plantar fasciitis (predisposed by a plantar enthesophyte) is visualized as edema-like SI within the plantar aponeurosis which contrasts well against SI of more superficial fat. Pigmented villonodular synovitis is best identified by hypointense (owing to the presence of hemosiderin) joint deposits on conventional MRI, while inflammatory arthritis exhibits a characteristic enhancing pannus.