

86. Insufficiency Fractures and Degenerative Disease of the Hip

Insufficiency fractures are commonly encountered in the osteoporotic population. Proximal femur fractures are typically evaluated by conventional radiography, although diagnosis of otherwise occult fractures on MRI (i.e. a subcapital fracture) facilitates early intervention. Fractures characteristically demonstrate hyperintensity on STIR and FS T2WI as well as linear hypointensity on T1WI perpendicular to the direction of force. Stress-type fractures often involve structures predisposed to traction stress or that bear more mechanical load during activity: the femoral neck and trochanters, iliac spines, ischial tuberosities, pubic rami, or sacrum. A left pubic insufficiency fracture is illustrated on the T1 and FS T2WI of Fig. 86.1A,B, respectively. The left parasymphysial area of the pubis exhibits low SI on (A)

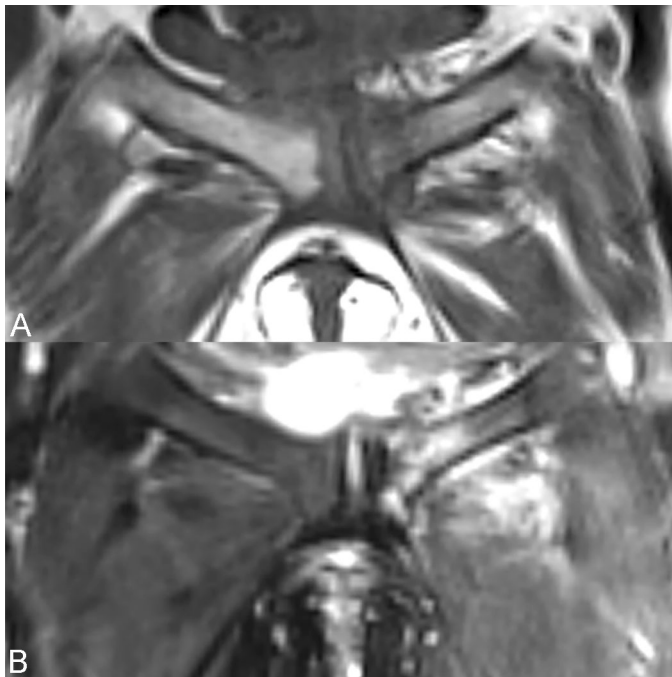


Fig. 86.1

T1WI with a more lateral linear band of hypointensity, perpendicular to the direction of weight-bearing. (B) FS T2WI demonstrates hyperintensity within this region, further suggesting an insufficiency fracture. Bone contusion may appear similar, but differs in clinical history and also in the lack of linear-appearing hypointensity. Figure 86.2A illustrates a sacral insufficiency fracture on the coronal T1WI of a pelvic MR examination. Vertically-oriented diffuse hypointensity is present within the lateral right sacrum on this image, consistent with an insufficiency fracture. Sacral fractures are occasionally seen and diagnosed on lumbar spine MR (being one cause of ‘low back pain’), although they may be

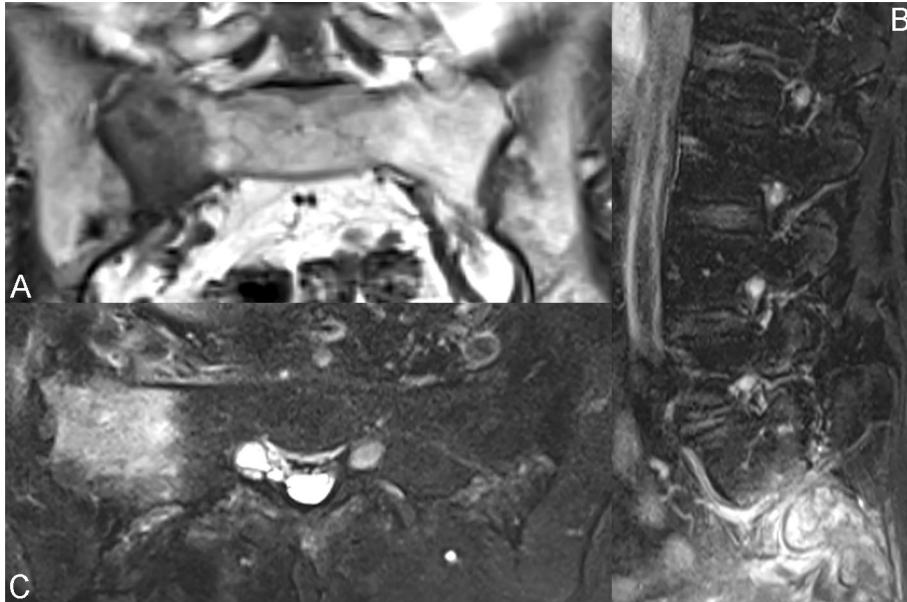


Fig. 86.2

missed due to location at the periphery of the region of interest, as in Fig. 86.2B. Abnormal hyperintensity within the sacrum may not be readily evident on this sagittal FS T2WI, but is easily visualized on the axial FS T2WI of Fig. 86.2C.

Degenerative hip disease is commonly evaluated on conventional radiography and is predisposed by femoroacetabular impingement. In cam impingement normal femoral head-neck off-set is decreased, as opposed to pincer impingement in which acetabular over-coverage (of which there are several varieties) is responsible. Accurate labral and cartilaginous evaluation is possible with MRI. While labral tears are visible as linear or irregular labral hyperintensity on T2WI, FS PDWI, and indirect arthrography (i.e. intravenous contrast administration), sensitivity to tears is greatly improved by direct arthrography. The invasiveness of the latter can be a disadvantage, as is the potential for artifacts from extraarticular contrast leakage and air bubbles—the low SI of which may mimic free fragments of osseous cortex. The normal fibrocartilaginous labrum appears as a hypointense triangular structure on coronal images. At the margin with the lateral acetabular rim, the labrum covers hyaline cartilage. On MR arthrography Czerny Stage 1, 2, and 3 lesions consist, respectively, of abnormal labral high SI not extending to its surface, intraarticular contrast extending into the labrum, and labral detachment. A and B substages are based on the preservation or obliteration of the perilabral sulcus, respectively. Figure 86.3A,B are FS T1WI obtained after intraarticular gadolinium chelate injection. The superior labrum is infiltrated with contrast (Fig. 86.3A, white arrow), although the perilabral space (small black arrow) is preserved—a Stage 2A lesion. Inferior labral detachment is also present, Stage 3A (Fig. 86.3A, black arrow). A posterior tear (Stage 2B)

is seen in the oblique axial plane (i.e. parallel slices to the femoral neck) (Fig. 86.3B, white arrow). Examination in all imaging planes is important as evaluation of the anterosuperior labrum (the most common location of tear) is limited in the coronal plane due to a change in labral orientation in this region. Normal attachments to the acetabulum may mimic a tear on conventional MRI due to nearby intermediate SI of articular cartilage. On arthrography no contrast should infiltrate this area, in distinction to Fig. 86.3C where the anterior labrum is detached from the acetabulum. Labral thickening has also obliterated the perilabral sulcus in this Stage 3B lesion. A full-thickness defect of the normally intermediate SI articular cartilage is illustrated in Fig. 86.3D (white arrow), contiguous with abnormal SI in the superolateral labrum. Adjacent supraacetabular cysts are present. Such paralabral cysts result from the dissection of synovial fluid through a labral or acetabular tear and are best visualized as hyperintensity on STIR or FS T2WI. With increasing mucinous or proteinaceous content, the normally low SI of these cysts on T1WI will increase. Cyst enhancement on direct arthrography occurs only if connection to the joint space persists, while enhancement is variable on indirect arthrography.



Fig. 86.3