49. Metastatic Disease

Metastatic disease at other levels of the spinal column and its effects on the central spinal canal have been previously discussed (See Chapters 35 and 38). The lumbar spine is the second most common location of vertebral metastases (after the thoracic spine), and renal, gastrointestinal, and prostate cancer demonstrate a predilection for the lumbosacral region. The rationale for the SI changes associated with metastases to the vertebral bodies was described in Chapter 35. Essentially in an adult, there is a majority of fatty compared to hematopoietic marrow, and as such vertebral bodies demonstrate high SI on T1WI, due to the short T1 of fat. Note that this appearance is largely absent in the vertebral bodies illustrated in Figure 49.1 A. Confluent metastases have resulted in the replacement of high SI marrow fat, resulting in the majority of the lumbar vertebrae, in addition to S1, demonstrating low SI on T1WI. Higher SI vertebrae or portions thereof as in L5 and S2 represent normal fatty marrow. FS FSE T2WI (B) demonstrate these lesions as more focal-appearing hyperintensities against the suppressed fat SI in the involved vertebral bodies. Edema associated with metastatic disease (as well as the metastatic tissue itself), as has been previously discussed, is difficult to detect on FSE T2WI without fat suppression. A hemorrhagic metastasis may occasionally prove an exception to the above principles,
Essentials of Clinical MR, 2nd edition

Fig. 49.2

presenting as hyperintensity on T1WI. In addition, sclerotic and hypercellular metastases tend to demonstrate low SI on FS T2WI. As previously discussed in Chapter 38, metastatic multiple myeloma—the most common primary bone tumor—may demonstrate a variety of appearances on MRI including normal (no detectable abnormality). Diffuse and multifocal lesions are also seen, the latter illustrated in Figure 49.2 A, B on pre and post-contrast T1 and FS T1WI, respectively. On the non-enhanced scan, there is involvement of the most inferiorly displayed vertebral body—L5. This vertebral body partially enhances in Figure 49.2 B. Additional small hypointense metastases are seen on the pre-contrast images but are more easily visualized after contrast administration (black arrows). Contrast-enhanced imaging must be performed with fat suppression, to allow clear depiction of enhancing lesions against the suppressed SI of vertebral bodies. As the bodies contain greater amounts of marrow compared to the remainder of the vertebrae, they are more commonly sites of metastatic vertebral involvement. The posterior elements must, however, also be scrutinized for the presence of metastatic disease. In Figure 49.2 B, the metastatic lesion within the S1 spinous process is very subtle, but enhances brightly with contrast administration along with the other smaller vertebral body lesions (black arrows). Concomitant involvement of the anterior body and posterior vertebral elements is illustrated in Figure 49.3 A, B. Sagittal T1WI reveals loss in height of the L5 vertebral body compared to L4 and diffuse hypointensity within the former, consistent with replacement of normal vertebral body fat. While compression of the thecal sac and posterior extent of this mass are clearly identifiable on these images, more precise characterization of the tumor’s extent and resulting canal compression is possible with (B) the axial T1WI. Evident here is

Runge, von Tengg-Kobligk, Heverhagen
obliteration of the left L4 lamina, pedicle, and transverse process. The compressed spinal canal itself is hypointense to this large mass and displaced posterolaterally to the right, posterior to the remaining hyperintense epidural fat. Contiguous spread of this metastatic lesion extends posterior to involve the paraspinal musculature on the left and laterally to displace the nearby left psoas muscle anterolaterally. This extensive metastatic lesion was found to be secondary to a ganglioneuroblastoma primary.