37. Disk Herniations

Motion from CSF pulsation, respiration and the beating heart complicate imaging of the thoracic spine. These effects can be minimized by the use of gradient moment nulling and saturation pulses. Proper evaluation of the thoracic spine begins with the acquisition of localizer sequences. Numbering begins from the dens, proceeding downward. Proper identification of lesions in this manner is necessary as the number of vertebrae in a given person is variable, owing most frequently to the presence of a sacralized L5 or lumbarized S1. Modern MR systems provide routinely both a whole body/spine scout and automated vertebral body labeling. Figure 37.1 A is a localizer consisting of composed images of the cervical, thoracic, and lumbar spine. If the entire spine is being imaged during a single given session then, as seen here, high resolution images can be used for the localizer image. In the T2-weighted localizer scan shown, pathology of the cervical spine is identifiable in this Chiari 1 patient, including occipital decompression (note the missing posterior arch of C1) and a small cervical syrinx. In the thoracic spine, disk herniations are present at two levels. Figure 37.1 B more clearly demonstrates the herniation at T11-12, which appears as a high SI protrusion outlined by the low SI PLL on this axial T2WI. While the herniation does not visibly contact the cord on this image, with movement (such as bending), there can be contact and the cord can become deformed (as seen in this patient). Regardless of location – cervical, thoracic or lumbar, acute and chronic herniations can appear identical on MR, with adjacent osteophytes suggesting the latter. The disk herniation in Figure 37.2 A (at the upper of the two involved levels) thus appears to be chronic by virtue of its adjacent, superior osteophyte. This cord-deforming disk herniation appears as intermediate and low SI on T1 (B) and T2WI (C), respectively. Generally speaking, smaller

Fig. 37.1

Fig. 37.2

lesions than seen at other levels will impinge upon the thoracic cord due to its anterior position within the subarachnoid space. Such small disk herniations are optimally imaged with thin slices in the axial plane. With thinner slices, fewer protons are available within a slice to create signal, and SNR is reduced. Higher field strength provides greater SNR; thus, imaging at 3 T allows routine acquisition of slices ≤ 3 mm thick on MR. Such images are demonstrated in Figure 37.2 B, C. Notably, sequences optimized for 1.5 T systems when performed at 3 T will result in poor image quality. The axial T1WI in Figure 37.2 B, for example, was not acquired with a traditional FSE sequence as would be used at 1.5 T but rather a technique known as VIBE (volume interpolated breath-hold examination). CSF pulsation artifacts represent another dilemma in imaging the thoracic spine. Figure 37.3 A, B demonstrate the typical appearance of a small central disk herniation on sagittal and axial T2WI, respectively. On the latter, however, the additional areas of low SI within the hyperintense CSF complicate image interpretation. Pulsatile motion within the CSF—greatest in the thoracic spine and in the young—creates a flow void effect resulting in a decrease in SI.

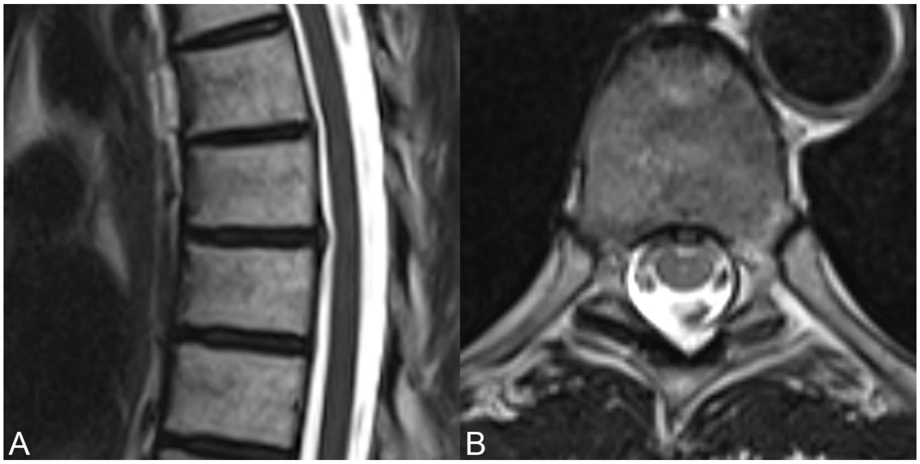

Fig. 37.3