37 Disk Herniations

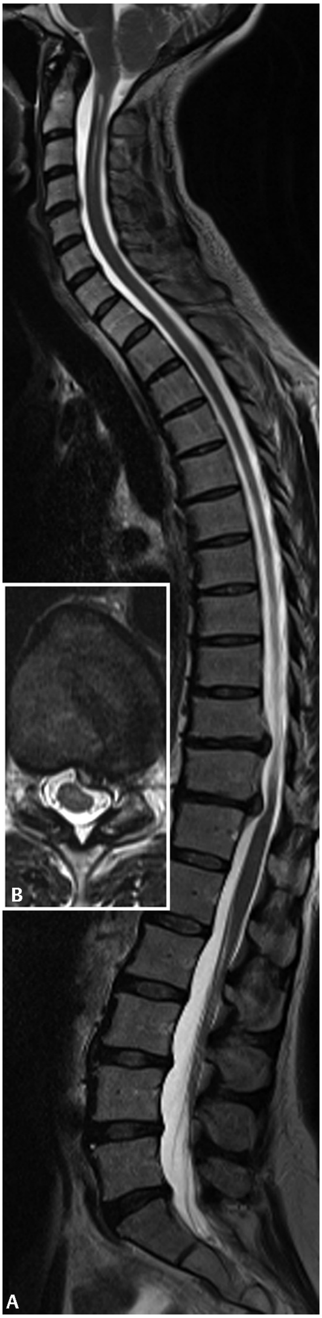

Fig. 37.1 (A,B)

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. **Figure 37.1A** is a standard localizing scan 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. Alternatively, a faster localization scan can be obtained by overlaying lower quality images to form the composed sagittal image. In this particular T2W localizer scan, 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, two areas of herniation are present. **Figure 37.1B** more clearly demonstrates the herniation at T11–T12, which appears as a high SI protrusion outlined by the low SI PLL on this axial T2WI. Although the cord does not visibly contact the herniation itself on this image, with movement (such as bending), there can be contact and the cord can become deformed. As throughout the spine, acute and chronic herniations appear identical on MRI with adjacent osteophytes suggesting the latter. The disk herniation in **Fig. 37.2A** (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 lesions than seen at

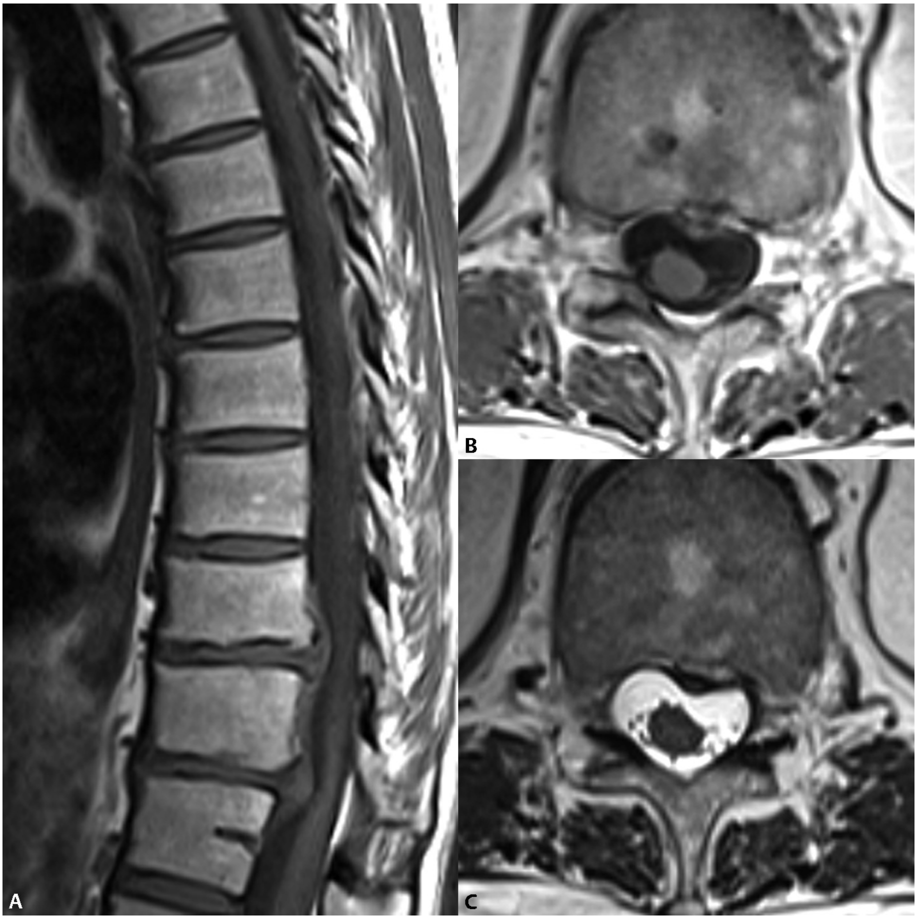

Fig. 37.2 (A–C)

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. With greater magnet strengths, however, more protons are recruited for signal creation; thus, imaging at 3 T allows routine acquisition of slices ≤3 mm thick on MRI. Such images are demonstrated in **Figs. 37.2 B,C**. Notably,

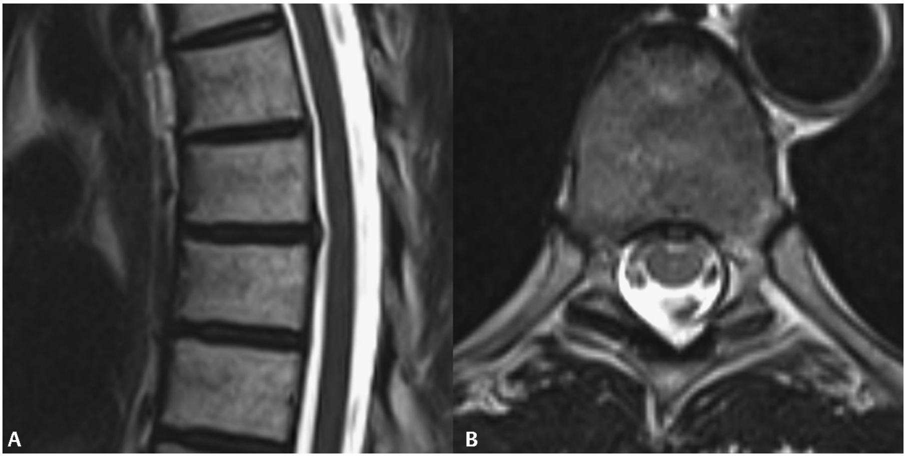

Fig. 37.3 (A,B)

sequences optimized for 1.5 T systems when performed at 3 T will result in poor image quality. The axial T1WI in **Fig. 37.2B**, 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. **Figures 37.3A** and **37.3B** 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 obscure complete evaluation. Pulsatile motion within the CSF—greatest in the thoracic spine and in the young—has resulted in a flow void effect in this instance with resulting foci of decreased SI appearing within the normally high SI CSF.