

44. Disk Herniations

Pathologic extensions of the intervertebral disk beyond the vertebral end plate margin are categorized as bulges, protrusions, extrusions, or free fragments. A disk bulge results from laxity of and tears within the annulus fibrosis that allow non-focal extension of the nucleus pulposus, with the posterior disk margin forming a smooth, curvilinear contour. Disk bulges are broad-based, circumferential, and may narrow the spinal canal and neural foramen. A disk protrusion, in distinction, is a focal extension or herniation of disk material beyond the posterior end plate margin. Disk protrusions and extrusions are similar but distinct entities, extrusion referring to a protrusion of the nucleus pulposus in which no intact annular fibers remain. Looking at the anatomic appearance, in a protrusion the disk herniation maintains a broad base with the parent disk, whereas with an extrusion there is a narrow base or neck that maintains continuity with the parent disk. This distinction cannot reliably be made in every instance on MR, and thus the term disk protrusion is often reserved for a small herniation and extrusion for a large herniation. It is imperative to distinguish whether a disk herniation is central, paracentral, or foraminal in location. Figure 44.1 A, B demonstrates a disk extrusion at the L4-5 level on sagittal T2 and axial T1WI, respectively. Herniations at

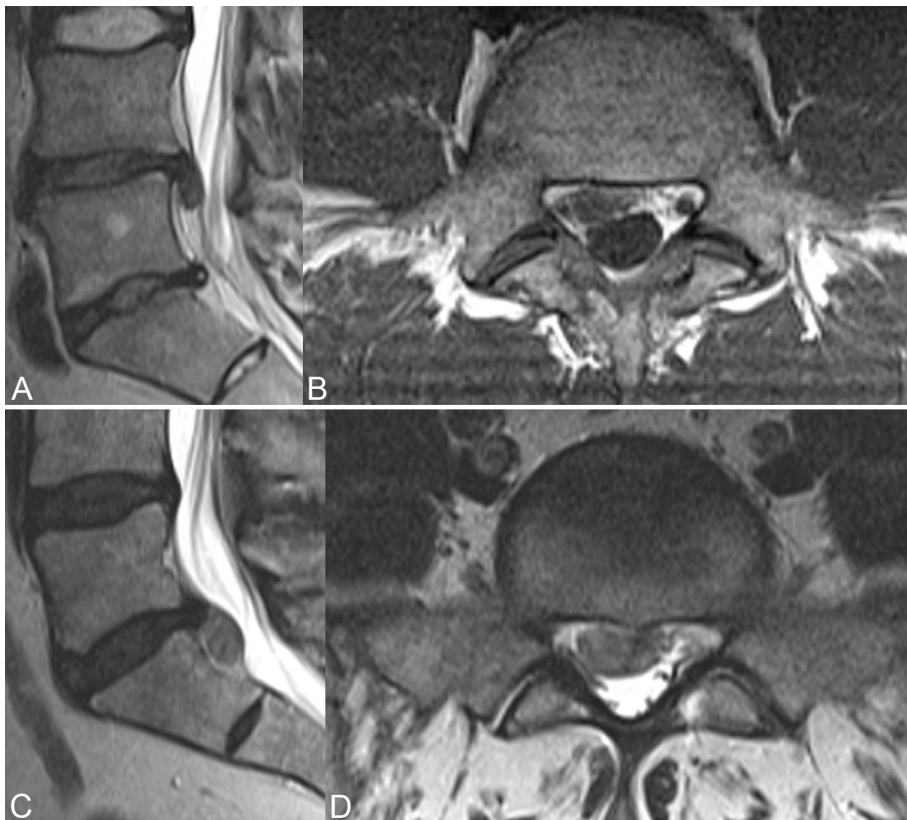


Fig. 44.1

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L4-5 and L5-S1 comprise 90% of lumbar herniations. This particular extrusion migrates inferiorly on (A) sagittal T2WI and is isointense to the native disk. In the setting of herniation, the native disk may demonstrate a lower than normal SI on T2WI, owing to desiccation and occasionally intradiscal gas. (B) Axial T1WI localize this extrusion to a right paracentral location. Note the preserved hypointensity of the left L5 nerve within high SI epidural fat, having just exited from the thecal sac. The right epidural fat and L5 nerve, in distinction, are obliterated by this paracentral herniation. Examination of the epidural fat, more prominent in the lumbar spine, allows for the detection of subtle disk herniations on axial T1WI. Paracentral herniations tend to impinge the exiting nerve root, whereas foraminal herniations compress the ganglion or nerve root in the foramen. Thus, while the paracentral herniation in Figure 44.1 A, B compresses the exiting L5 nerve root, a foraminal herniation at this vertebral level would involve L4. Acutely compressed nerves may exhibit high SI edema on T2WI and enhance, although CE imaging is not routinely acquired in this patient population. Central herniations less commonly result in radiculopathic symptoms. A central and right paracentral disk herniation at L5-S1 is illustrated in Figure 44.1 C, D. Note that again the herniated disk has migrated somewhat inferiorly on (C) sagittal T2WI, while (D) axial T2WI demonstrates impingement of the exiting right S1 nerve root. Also note that this herniation is hyperintense to the native disk on these T2-weighted images. Although the hyperintense inferiorly extending portion of the extrusion is in apparent contiguity with the native disk, this change in SI is suggestive of a disk fragment—an important finding pre-operatively. Large disk herniations also commonly demonstrate rim-enhancement (due to peripheral fibrotic tissue) post-contrast. A synovial cyst, illustrated in Figure 44.2 A-C, may mimic a disk herniation in appearance and symptomatology. (A) Sagittal T2WI demonstrates a lesion isointense to CSF with a low SI outline. The SI of synovial cysts is variable, depending on cyst contents, but such cysts are generally isointense to CSF on T1 and T2WI. The (B) axial T2WI localizes the lesion to predominantly the right side of the spinal canal and demonstrates its association with a severely degenerated right facet joint—an association present in most cases of symptomatic synovial cysts and a key feature in their differentiation from disk herniations. The cyst displaces the thecal sac to the left and obliterates the right lateral recess. (C) CE T1WI demonstrates the rim enhancement typical of a synovial cyst. Conjoined nerve roots may also be confused for small disk herniations on CT but are readily distinguished on MR by their isointensity to CSF. Metastases to the epidural space are infrequently centered at the disk level and demonstrate homogeneous contrast enhancement, permitting easy differentiation from disk herniations and synovial cysts.

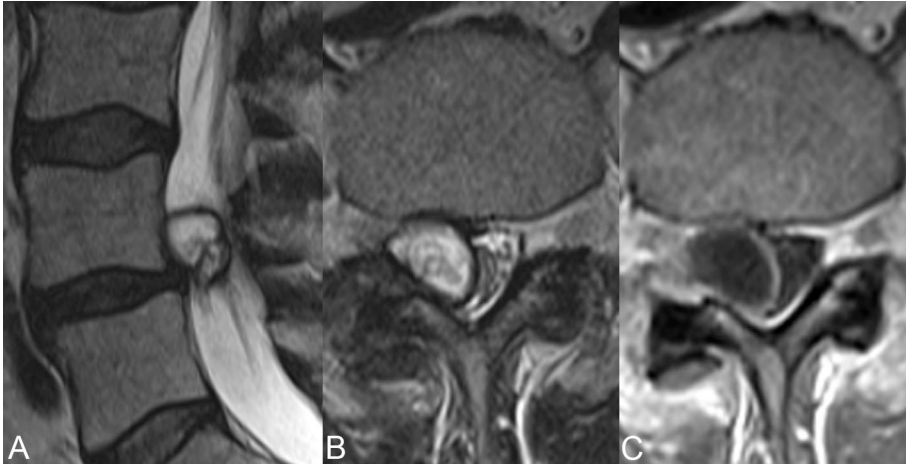


Fig. 44.2