Gadolinium chelate contrast agents are routinely utilized in the MRI evaluation of the postoperative spine to distinguish epidural fibrosis (scar) and recurrent disk herniations—both important etiologies of failed back surgery syndrome. There is good specificity for this distinction utilizing contrast-enhanced scans acquired less than 20 minutes following contrast administration at 3 months or more after surgery. Figures 45.1A through 45.1F illustrate this use. On sagittal (A) T1 and (B) T2WI there is a defect in the right L5–S1 lamina as a result of prior posterior decompression surgery. In addition, a low to moderate SI focus of soft tissue protrudes posteriorly at the level of the L5–S1 disk. On the basis of these images alone, such a finding, which appears to extend from the desiccated, compressed L5–S1 intervertebral disk, might be mistaken for a disk herniation. (C) Contrast-enhanced FS T1WI, however, shows this soft tissue focus to enhance uniformly following contrast administration—an appearance consistent with epidural fibrosis or scar. Axial (D) T1, (E) T2, and (F) FS contrast-enhanced T1WI more clearly demonstrate the partial right-sided facetectomy and laminectomy, with scar extending from the defect to the anterior epidural fat, crossing the midline to contact the left S1 nerve root. Sagittal contrast-enhanced T1WI illustrates envelopment of the low SI right S1 nerve root by the enhancing epidural fibrosis. The rationale for the enhancement of fibrotic tissue relates to extravasation of gadolinium chelates through leaky tight junctions in the vascular endothelium, leading to accumulation of such agents within the extracellular space. Fat may be grafted in the laminectomy bed to reduce epidural scarring with MRI findings accordingly appearing as high SI foci on T1WI within the region of the posterior elements. In distinction to epidural fibrosis, a recurrent disk herniation will not enhance uniformly. Figures 45.2A through 45.2F illustrate sagittal and axial images from a patient that, in addition to the degenerative findings present, has undergone bilateral L3–L4 laminectomies. A large low SI lesion is present within the spinal canal on (A) T1 and (B) T2WI. The latter clearly illustrates marked narrowing of the central canal. Although such an appearance could represent epidural fibrosis, the pattern of enhancement on (C) sagittal contrast-enhanced T1WI is diagnostic for a recurrent, inferiorly migrated disk extrusion at the site of prior surgery.
Axial (D) T1WI and (E) T2WI illustrate the postoperative posterior element defect and localize the extrusion to a left paracentral location. (F) Contrast-enhanced T1WI illustrates rim-like enhancement of the disk herniation, correlating with surrounding scar tissue.

Early postoperative imaging of the spine must be performed with caution due to prominent soft tissue edema present immediately (<6 weeks) following surgery. Characterization of operative procedures can often be made on MRI. Findings associated with vertebroplasty are discussed in Chapter 43, while a laminectomy consists of removal of the ligamentum flavum along with the portions of the neural arch. Discontinuity in the low SI ligamentum flavum is often useful in detecting a site of operative intervention. In a laminectomy, the entire spinal lamina is removed along with the ligamentum flavum. Defects from diskectomy may also be seen as may osseous spinal fusions of articular processes. Additional complications of lower back surgery include arachnoiditis (see Chapter 48), radiculitis, postoperative infection, and pseudomeningocele. Radiculitis is apparent on MRI as postoperative spinal nerve root enhancement. This may be confused with normal enhancement seen in the dorsal root ganglia, which lack an intact blood–neuron barrier. Findings of postoperative infections within the spine are similar to those described in Chapter 48. In the postoperative patient, however, a concurrent paravertebral infection will often be present. Such pathology is well depicted on STIR or FS T2WI as hyperintense, and on contrast-enhanced T1WI as heterogeneously enhancing, soft tissue. Because similar changes may be seen as a result of normal inflammation in the early postoperative patient, MRI must be interpreted with caution in this setting. A pseudomeningocele is a nonenhancing, CSF SI fluid collection communicating with the thecal sac but not lined with meningeal tissue. In the presence of ferromagnetic orthopedic hardware, evaluation of the spine may be limited due to susceptibility artifacts. Susceptibility is an intrinsic physical property referring to the ability of an object to become magnetized thus resulting, in the context of MRI, in inhomogeneity of the main magnetic field, leading to the appearance of artifact. If all other scan parameters are equal, effects from susceptibility result in greater artifact at 3 T than at 1.5 T. Gains in SNR at 3 T, however, allow utilization of techniques that diminish artifacts from susceptibility while preserving SNR levels equal to or above that achievable at 1.5 T, and thus diagnostic quality postoperative spine MRI is well-performed at both field strengths.