

34. Other Inflammatory/Infectious/Degenerative Diseases

At autopsy spinal cord involvement is seen in essentially all cases of multiple sclerosis (MS). Cord lesions are also part of the consensus criteria for the MRI diagnosis of MS (see Chapter 18). Furthermore isolated spinal involvement may occur in up to a quarter of cases, and suggestive lesions on spinal MRI are much more specific for MS than are hyperintensities on T2WI of the brain. Thus MRIs of the brain, cervical, and thoracic spine comprise a complete imaging evaluation of MS. MRI of the lumbar spine—where the spinal cord is absent—need not be performed. Figure 34.1 A demonstrates a fast spin-echo (FSE) T2WI of an MS plaque in the cervical spine with a focal area of high SI (black arrow) extending longitudinally within the cord. As is typical for MS, this lesion exerts little mass effect and its spans less than two vertebral body segments in length. Occasionally edema above and below a plaque may result in a flame-like appearance on sagittal images. In Figure 34.1 the lesion on sagittal MRI (A) is more subtle in appearance than in the axial GRE (B) and FSE T2WI (C). The axial plane is preferred to sagittal imaging for the detection of MS in the spinal cord due in part to partial volume averaging—a term referring to the fact that the SI of a voxel on MRI represents an average of SI over a volume of actual tissue. Thus in a longitudinally extending MS plaque of thin width, the SI of a voxel in the sagittal plane may contain SI contributions from both the plaque itself and also from normal cord, the average of the two contributing to a less conspicuous appearance of plaque on the final image. Lesions are typically not well-visualized on T1WI

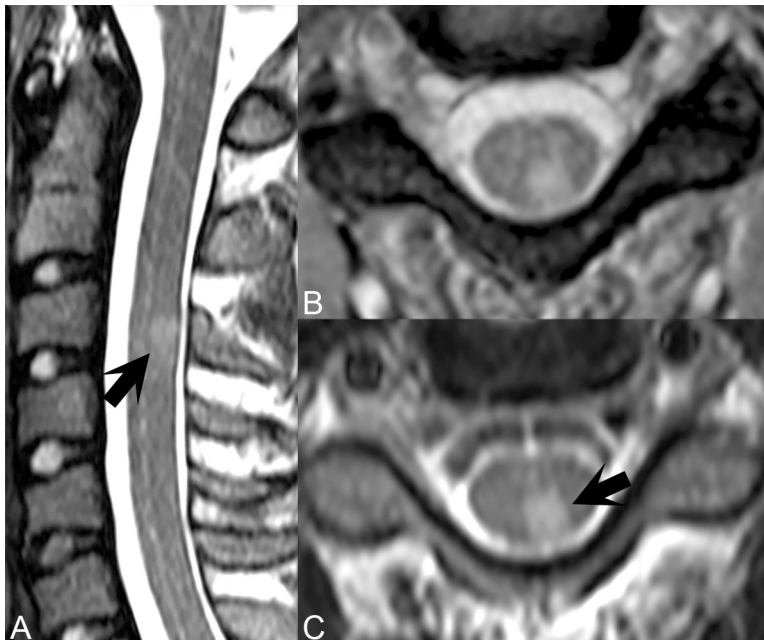


Fig. 34.1

due to relative isointensity to the cord. In Figure 34.1 lesion conspicuity is also slightly greater on (C) the axial FSE (black arrow) than on the (B) GRE (note the extremely low SI of the osseous structures secondary to susceptibility effects) images in the same plane—a condition that holds true generally. Figure 34.2 A (black arrow, GRE) demonstrates the tendency of cord plaques to indiscriminately affect gray and white matter, although the majority of cross-sectional cord area is spared even in this large lesion. There is also subtle mass effect, which is not uncommon. Small peripheral lesions (Fig. 34.2 B, white arrow) may be difficult to detect even in the axial plane, emphasizing the need for optimal imaging technique. Changes in cord morphology due to a plaque may be appreciated and can manifest as focal atrophy (Fig. 34.2 C, black arrow) or enlargement of the cord. The former correlates with increased clinical disability and chronicity, whereas focal enlargement is indicative of active lesions.



Fig. 34.2

As previously mentioned, optimal imaging techniques and pulse sequence selection are essential for the reliable detection of MS. For example, Figure 34.3 A, B demonstrates a lesion (B, black arrow) of the conus as seen on (A) FSE T2WI and (B) STIR (short tau inversion recovery)—the latter being a sequence in which an initial radiofrequency pulse is added with the purpose of suppressing signal from protons with a short T1, resulting in the nulling of SI from fat. For the detection of multiple sclerosis, STIR T2WI sequences are more sensitive than FSE in the cord, as evident from Figure 34.3 A, B, despite lower spatial resolution (note the image blurriness). Fluid attenuated inversion recovery (FLAIR)—a sequence with tremendous utility in brain MR—consists of a similar initial pulse but one that is timed to suppress SI from protons with longer T1, specifically SI from CSF. FLAIR is however not employed for imaging of cord MS lesions, for many reasons. The use of FSE T2WI, while helpful in other settings, diminishes the conspicuity of MS lesions, impairing diagnosis. Motion and pulsation artifacts inherent to imaging of the thoracic

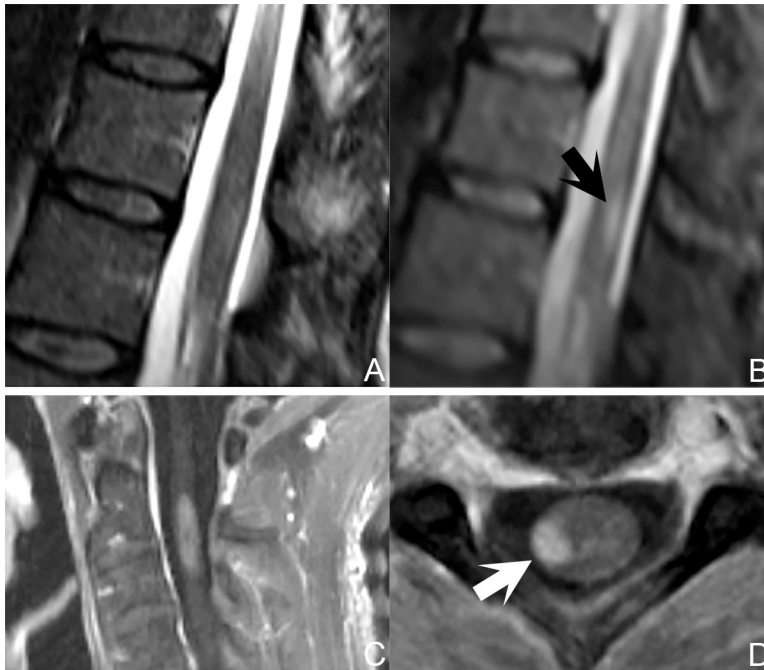


Fig. 34.3

spine may also hinder the detection of MS lesions occurring therein. Administration of intravenous contrast is another consideration as enhancement is frequently seen in symptomatic lesions and is indicative of plaque activity. (C) Sagittal and (D) axial images in Figure 34.3 demonstrate an elliptical-shaped enhancing lesion (white arrow).

Acute transverse myelitis may mimic MS both clinically and on MRI. Typical findings include a high SI focal abnormality on T2WI with fusiform cord enlargement. Unlike those of MS, lesions of transverse myelitis extend over several vertebral segments and occupy the majority of the cross-sectional cord area. Specific criteria have been developed for diagnosis. Inclusion criteria ascertainable on MRI include ruling out of compressive extraaxial etiologies as causes for neurologic findings and the presence of gadolinium enhancement, the latter indicative of cord inflammation. Without evidence of inflammation, which may also be obtained through CSF studies, close followup imaging and lumbar puncture are recommended. Intracranial findings suggestive of MS are exclusionary. Figure 34.4 demonstrates a case of subacute combined degeneration—the spinal cord abnormality associated with vitamin B12 deficiency (subacute combined degeneration)—in an individual with pernicious anemia. Areas of high SI on T2WI within the dorsal (as seen here) and lateral columns are the most common MR findings.

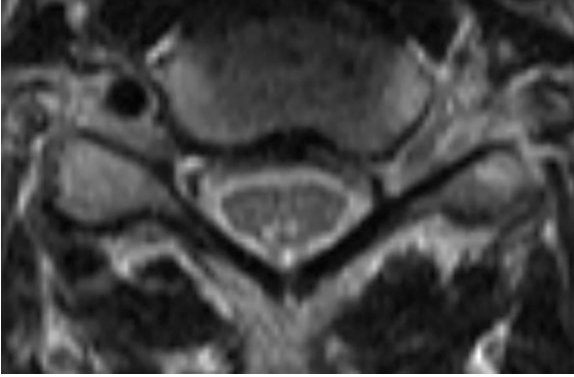


Fig. 34.4