CHAPTER A8
Extradural Spine

INTRODUCTION

Technical advancements in both hardware and software have improved the speed at which, progressively, imaging of the spine at ever higher resolutions can be undertaken with reproducible success. If success is loosely defined as the ability of an imaging modality to accurately diagnose clinically relevant disease, then MRI has achieved that goal.

One of the major successes of modern intravenous (IV) contrast–enhanced MRI is its ability in most cases to focus a disease process to a particular spinal compartment: intramedullary, intradural-extramedullary, extradural (i.e., epidural), and mixed. This is an important concept because this knowledge will assist in narrowing the differential-diagnostic possibilities and help direct specific additional diagnostic procedures—e.g., needle biopsy (aspiration) or surgical therapies. While other chapters will elaborate the findings in each one of these compartments, the present chapter will discuss extradural disease of the spine (Table A8.0.1).

UNIT A8.1 will outline the protocols that will enable the analysis of the normal and pathologic intervertebral disc. Specifically, terminology for normal and degenerated disc are defined in order to allow reliable visualization of disc pathology.

UNIT A8.2 discusses the protocols that will define the various subtypes of spinal stenosis and the protocols utilized to diagnose each of them. These protocols will allow the medical imaging specialist to determine the level, region, and degree of severity of the stenosis present.

UNIT A8.3 details the protocols that will allow the evaluation of spondylosis deformans or degenerative osteophyte formation. These protocols will reveal the presence, level, and severity of peridiscal, uncovertebral, and posterior spinal facet (zygoapophyseal) joint osteophytosis and their effect on the central spinal canal and spinal (intervertebral) neural foramina.

UNIT A8.4 outlines the protocols used for demonstrating infectious and noninfectious spinal inflammation. These protocols will allow the visualization of the focus and extent of the inflammatory processes, as well as the presence or absence of involvement of the central spinal canal and perispinal soft tissues.

UNIT A8.5 details the protocols best utilized to reveal the presence and extent of primary or metastatic neoplasia involving the spine. In addition, related pathologic changes, such as pathologic fractures and epidural tumor extension with spinal cord/cauda equina compression, are also well analyzed with these techniques.

UNIT A8.6 describes the protocols used to evaluate the patient with either acute or remote spinal trauma. These techniques will allow the determination of the extent of injury and the tissues involved, and thereby will enhance therapeutic planning.

UNIT A8.7 has some overlap with protocols of other units in this chapter. Many disease processes may cause compression of the spinal cord and/or cauda equina. The protocols

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Current Protocols in Magnetic Resonance Imaging (2003) A8.0.1-A8.0.3

Table A8.0.1 Differential Diagnosis of Extradural Spinal Lesions

Developmental
Lipoma
Extradural arachnoid cyst
Developmental central spinal canal stenosis
Vascular
Vertebral hemangioma with pathologic vertebral expansion or epidural extension
Primary epidural hemangioma
Traumatic
Epidural hematoma
Foreign body (penetrating trauma)
Traumatic epidural air
Traumatic intervertebral disc herniation
Retropulsed vertebral fracture fragments
Inflammatory
Primary epidural phlegmonous (i.e., solid soft tissue) inflammation or abscess formation (e.g., bacterial, fungal)
Primary epidural infectious granuloma formation (e.g., tuberculosis)
Secondary epidural extension of inflammatory process (e.g., phlegmon, abscess, granuloma) from adjacent spondylitis/discitis
Primary epidural parasitic cyst formation (e.g., cysticercus, echinococcus)
Neoplastic
Epidural extension of primary neoplastic spinal disease (e.g., myeloma/plasmacytoma, giant cell tumor, eosinophilic granuloma, aneurysmal bone cyst, osteochondroma, osteoblastoma, chordoma, osteosarcoma, chondrosarcoma, Ewing's sarcoma, leukemia)
Epidural extension of hematogenously disseminated metastatic neoplastic spinal disease (e.g., carcinoma, sarcoma, lymphoma)
Primary epidural metastatic neoplastic disease
Schwannoma
Neurofibroma
Epidural extension of paraspinous neoplastic disease (e.g., lung tumor, renal tumor, fibrosarcoma, neuroblastoma)
Degenerative
Intervertebral disc herniation
Epidural gas from degenerated ("vacuum") intervertebral disc
Spinal osteophyte formation (e.g., vertebral body posterior facet joint)
Ligamentum flavum ossification
Ossification of the posterior longitudinal ligament
Degenerative spinal stenosis
Acquired
Extramedullary hematopoiesis
Amyloidosis
Postoperative epidural fibrosis
Iatrogenic extradural injection (e.g., from myelogram, epidural anesthesia)
Epidural lipomatosis
Paget's disease of bone with vertebral expansion

in this unit will enable the medical imaging specialist to pinpoint the degree and extent of disease in order to assist image-guided surgical decompressive procedures in minimizing permanent neurologic deficit.

UNIT A8.8 covers the protocols judged best for analyzing the postoperative spine for degenerative disease. These protocols will allow the definition and differentiation of the various types of pathology that may be present and responsible for recurrent signs and symptoms following spinal surgery.

In summary, the MRI protocols in this chapter are aimed at enabling the medical imagining specialist to acquire images that will define the general type of pathology present, its location and extent in three planes, and the effect of the pathologic process in intra- and perispinal tissues. In this way, the imaging physician will be best able to assist the referring clinical physician in attempting to minimize permanent neurologic deficit, and in enhancing timely positive patient outcome.

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