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Lateral  
Interbody  
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# Clinical Evaluation of Low Back and Leg Pain

Robert A. McGuire

When a patient presents with complaints of back and leg pain, the surgeon must consider many causes. To successfully treat the problem, of course, the correct diagnosis must first be made. The mode of onset of the problem is important, because injury mechanisms can give insight into the structures that serve as pain generators. It is extremely important to determine whether the pain is predominantly axial or radicular in nature, because the causes of each type of pain can be quite different. This chapter discusses the importance of a patient's history, the differential diagnosis, and the physical examination when evaluating patients with back and leg pain.

## HISTORY AND DIFFERENTIAL DIAGNOSIS

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When evaluating patients with back pain, it is paramount for the surgeon to determine whether the problem is predominantly axial or radicular (Box 5-1). Structures in the lower back that cause pain are muscular, ligamentous, and fascial. The intervertebral disc annulus can be painful, because it is highly innervated circumferentially in the peripheral portion of the structure. Kuslich et al<sup>1</sup> has elegantly shown that torn annular fibers can also result in radicular symptoms from irritation of the nerve and dorsal root ganglion as they pass near the inflamed structure. Bone and facet joints can also be a source of pain, and as the degenerative cascade progresses, degenerative by-products such as cytokines can produce centralized axial back pain. Compression of the neural structures, on the other hand, predominantly leads to either radicular or claudication symptoms.

When evaluating a patient's complaints of pain, it is important to assess—in detail—the patient's medical and surgical history, the onset and duration of the pain; exacerbating factors such as standing, sitting, coughing, sneezing, or other Valsalva maneuvers; and the quality of

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**BOX 5-1 History: Questions to Ask Patients Who Present With Low Back Pain (With or Without Leg Pain)**

- What is the onset of pain (acute or gradual)?
  - Is the pain episodic or continuous and progressive?
  - What factors precipitate the pain or alleviate the symptoms? Does the pain occur with activity? Is the pain alleviated with recumbency?
  - Are there any constitutional symptoms (fever, chills, or weight loss)?
  - Is there a history of bowel, bladder, or gait disturbance?
  - Does the pain radiate? If so, to what locations (for example, buttock, thigh, or below knee to foot; unilateral or bilateral)?
  - Is there a history of smoking? How much and for how long?
  - Is there a medical history?
    - Hypertension
    - Diabetes
    - Other medical condition for which medications or therapy has been prescribed
    - Allergies
- 

the pain. This information can assist the surgeon in determining the dermatomal pattern and locations of specific root involvement.<sup>2</sup> The history should include questions about exercise and social habits, such as tobacco and alcohol use.<sup>3</sup> Recent unexplained weight loss, chronic pain that has not responded to conservative management, a history of smoking, and being older than 50 can indicate a possible neoplastic process, which should be thoroughly evaluated. Previous surgeries, especially spinal procedures, should also be considered. Likewise, medical conditions that can cause neuropathy, such as diabetes, should be addressed, as should vascular conditions that can lead to either aneurysms or vascular occlusions, which, in turn, can result in back and leg symptoms.

Paresthesias (abnormal neurologic sensations that can include numbness, tingling, burning, and prickling), hyperalgesias (increased sensitivity), hypalgesias (decreased sensitivity), deep aching, or loss of sensation point to compression of a specific root. Nociceptive fibers to muscles, joints, and fascia are fewer in number and, when irritated, can result in a vague ache instead of specific radicular symptoms. Activities that aggravate or improve the problem should be explored. Hyperextension maneuvers of the spine that aggravate the symptoms suggest abnormalities of the facet joint or stenosis that is located either centrally or in the lateral recess. Pain that is aggravated by standing or active flexion or extension movements, but is relieved with recumbency, suggests mechanical instabilities.

Changes in neurologic function are of immediate concern. Any difficulties with bowel or bladder control, perineal anesthesia, and severe leg pain suggest a possible cauda equina syndrome, which should be evaluated as an immediate priority. Progressive weakness in spite of conservative management indicates a need for urgent surgical consideration. Sympt-

toms of myelopathy occur more commonly in the cervical and thoracic levels with involvement of the spinal cord, so abnormalities of gait with spasticity or lower extremity weakness, either unilaterally or bilaterally, suggest the need to evaluate the more cephalad upper motor neuron condition in greater detail.

A patient's psychological history is also important, because depression can manifest as low-back somatization complaints. Finally, it is important to find out whether a patient with leg or back pain is actively involved in a worker's compensation claim or litigation. Studies have shown that patients who are involved in such claims or litigation often exhibit exaggeration or somatization of their symptom complex.<sup>4,5</sup>

The quality of the pain is very important when evaluating back and leg pain symptoms. When looking specifically at low back pain, one must also consider the structures in the pelvis and the abdomen as potential pain generators. A deep ache in the lower back can be a result of abnormalities of the kidneys, ureters, or pancreas, and a thorough evaluation of the aorta must be performed to rule out a potential aneurysm. In addition to the soft tissues and vascular structures, the sacroiliac and hip joints can be a source of the deep ache from the bony structures of the pelvis.

Pain that extends into the lower extremities can also result from structures within the pelvis.<sup>6</sup> If the sacroiliac joint is inflamed, for example, the sciatic nerve can be irritated, resulting in radiating leg pain. Vascular claudication can result in leg pain that is classically described as a dull ache beginning in the calf region; this is aggravated by ambulation and is usually relieved with rest or by stopping the activity.

Inflammatory arthritic conditions such as rheumatoid arthritis and ankylosing spondylitis can also cause a deep ache in the lower back. Serology consisting of antinuclear antibodies (ANAs), sedimentation rate, rheumatoid factors, and genetic markers such as HLAB 27 can assist in the diagnosis of these conditions.

Neoplasia and infection should be considered as possible diagnoses in patients with low back and leg pain. Patients with primary bone tumors like myeloma often present with spinal pain; these patients can be evaluated using both serum electrophoresis, to check for monoclonal elevations, and urine studies, to evaluate for elevated Bence Jones proteins. Discitis and osteomyelitis can both initially result in intense local back pain; if allowed to progress, these conditions can result in radicular complaints as the nerve itself becomes compromised from the abscess—directly or indirectly—which occurs after disc space or vertebral body collapse. The nerve can also experience potential vascular compromise locally.

The patient's age can assist in the diagnosis of specific degenerative problems. Disc herniations, which result in both back and leg pain, usually occur in the third and fourth decades of life. Instability symptoms usually occur in the late fourth or fifth decade, whereas stenosis and degenerative spondylolisthesis usually manifest in the latter fifth, sixth, or seventh decades.

## PHYSICAL EXAMINATION

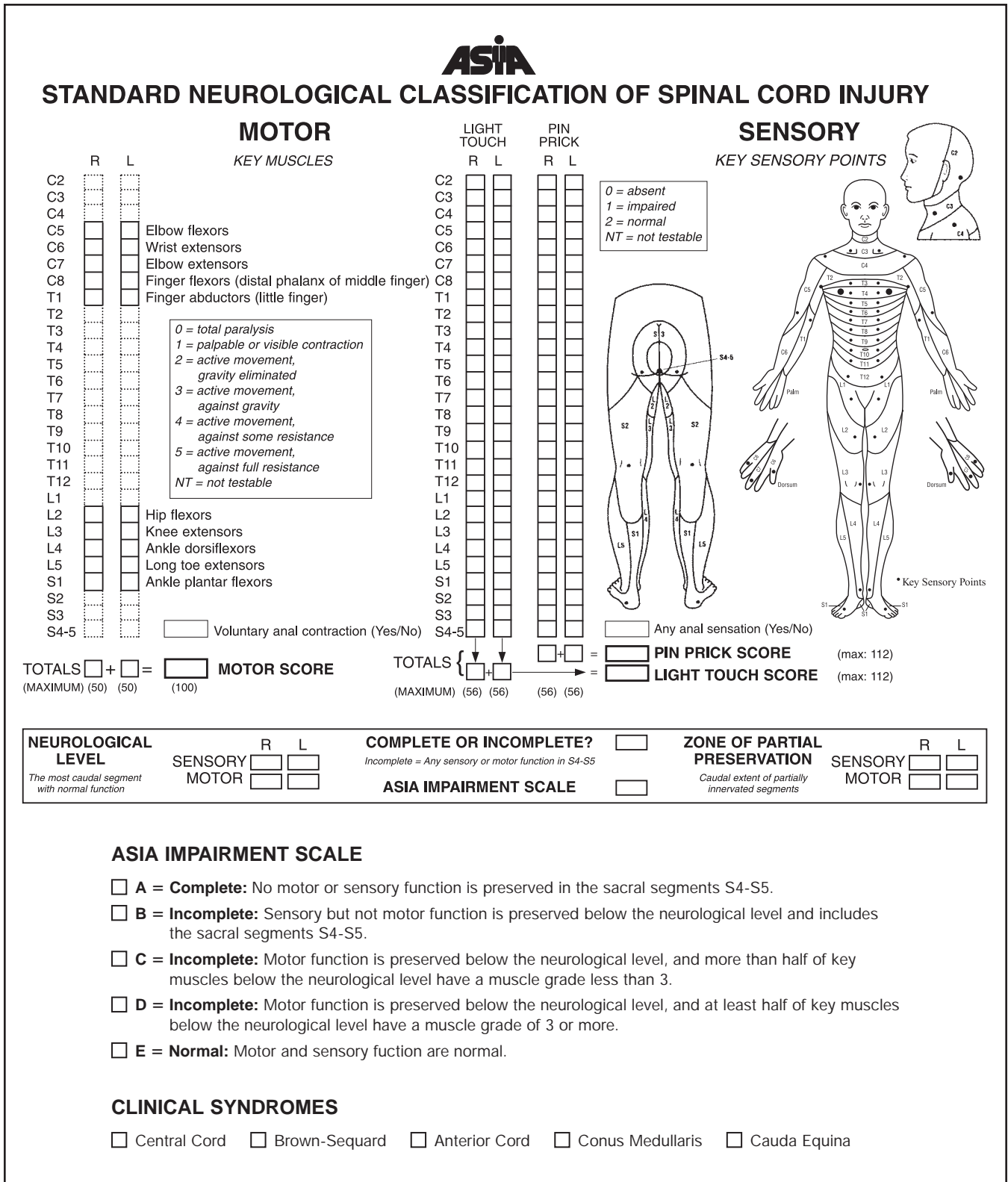
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After a thorough history has been obtained, a physical examination completes the evaluation (Fig. 5-1).<sup>7</sup> Visual analog pain scales can be helpful in assessing the intensity of the patient's pain; such a tool can be reliable and valid. Pain drawings provide information that can assist surgeons as they diagnose low back and radicular problems, although there are conflicting data about the success of predicting surgical outcomes using these tools.<sup>8</sup> These drawings can provide valuable insights into a patient's complaints as they relate to either radicular or sclerodermal symptoms or to psychological overlay (Fig. 5-2). These tools also yield relatively high, repeatable results. They are good for evaluating pain intensity, and, if nonanatomic in presentation, they can steer the care provider to focus more on the psychological profile instead of on the specific problem of nerve compression. Functional studies such as the Oswestry Disability Index and SF-36 give a self-rated assessment of impairment of daily activities as a result of the spinal problem. These tests are easy to administer and have high validity and responsiveness.<sup>9,10</sup>

Attention should be paid to the patient's demeanor in the examination room, which provides the surgeon with insights about whether the patient might have an anxious personality or significant psychosocial overlays.<sup>11</sup> The patient's gait should also be evaluated, as should the manner in which the patient sits, stands, and transitions from sitting to standing. Furthermore, the surgeon should conduct a thorough vascular examination to assess the patient's femoral, popliteal, dorsalis pedis, and posterior tibial pulses. The patient should also be questioned about whether he or she has experienced trophic skin changes such as loss of hair, dystrophic nails, and rubor; these are warning signs of poor circulation.

Sensory testing is performed in all dermatomes of the lower extremity, and the ability to detect differences in light touch, pain, and temperature should be checked during the examination. If differences are found in nonanatomic or stocking distributions, one should consider metabolic neuropathy, such as that caused by diabetes, as the potential cause. Dermatomal deficits, on the other hand, are usually the result of root compression from herniated nucleus pulposus, lateral recessed stenosis, or spondylolisthesis. Also, a strength evaluation confirms radicular symptoms, because muscle groups are innervated by specific nerve roots; the muscles may be weak if the corresponding innervating root is compromised. Reflexes also should be thoroughly evaluated as part of the physical examination. A decreased response indicates a compromise of the lower motor neuron or root level, and, again, if the nerve root is compromised, this indicates potential radiculopathy. A hyperactive response is present if there is upper motor compromise; if present, lesions of the brain or the cervical or thoracic cord must be considered.

Once the physical examination is complete, any necessary radiographic studies should be performed. These results can assist the surgeon in verifying the clinical findings and in deciding on an appropriate treatment.



<b>NEUROLOGICAL LEVEL</b> <small>The most caudal segment with normal function</small>	SENSORY <input type="checkbox"/> R <input type="checkbox"/> L MOTOR <input type="checkbox"/> R <input type="checkbox"/> L	<b>COMPLETE OR INCOMPLETE?</b> <small>Incomplete = Any sensory or motor function in S4-S5</small>	<input type="checkbox"/>	<b>ZONE OF PARTIAL PRESERVATION</b> <small>Caudal extent of partially innervated segments</small>	SENSORY <input type="checkbox"/> R <input type="checkbox"/> L MOTOR <input type="checkbox"/> R <input type="checkbox"/> L
		<b>ASIA IMPAIRMENT SCALE</b>	<input type="checkbox"/>		

#### ASIA IMPAIRMENT SCALE

- A = Complete:** No motor or sensory function is preserved in the sacral segments S4-S5.
- B = Incomplete:** Sensory but not motor function is preserved below the neurological level and includes the sacral segments S4-S5.
- C = Incomplete:** Motor function is preserved below the neurological level, and more than half of key muscles below the neurological level have a muscle grade less than 3.
- D = Incomplete:** Motor function is preserved below the neurological level, and at least half of key muscles below the neurological level have a muscle grade of 3 or more.
- E = Normal:** Motor and sensory function are normal.

#### CLINICAL SYNDROMES

Central Cord  
  Brown-Sequard  
  Anterior Cord  
  Conus Medullaris  
  Cauda Equina

FIG. 5-1 Physical examination, based on American Spinal Injury Association (ASIA) classification. (Reproduced with permission from ASIA.)







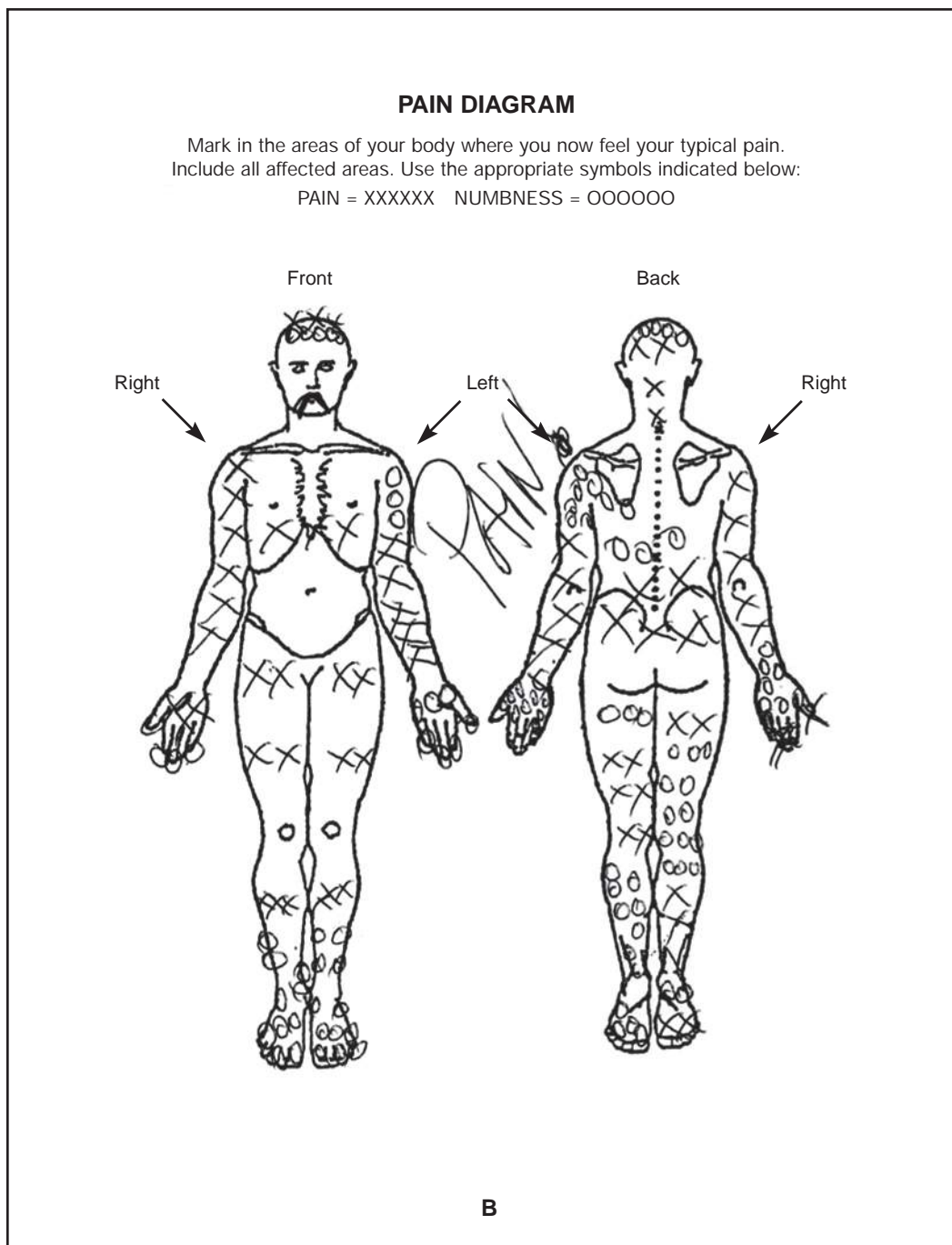


FIG. 5-2, cont'd B, The nonorganic presentation of pain in a patient with chronic pain who had two previous spinal procedures and a compensation claim pending.

## CONCLUSION

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A thorough history and physical examination in a patient with back and leg pain often provide an understanding of the patient's complaints, aggravating factors, and the specific areas of involvement. In addition, they can help facilitate the diagnosis and treatment planning.

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