2011 Imaging Criteria

Computed Tomography (CT), Lumbar Spine[1]

ICD-9-CM: 88.38
CPT: 72131, 72132, 72133
I/O Setting: Outpatient

INDICATION(S)

100 Suspected lumbar spine fracture
200 Suspected nerve root compression by lumbar disc herniation/foraminal stenosis
300 Suspected lumbar spinal stenosis
400 Suspected cauda equina syndrome ♦
500 Preoperative evaluation of osteomyelitis
600 Suspected bone metastasis
700 Follow-up bone metastasis after Rx

100 Suspected lumbar spine fracture **[One]**[2]
- 110 Neurologic deficit at/distal to injury and MRI not feasible[3, 4]
- 120 Possible unstable fracture by x-ray[5]
- 130 X-ray nondiagnostic/equivocal for fracture and Hx of trauma[6, 7]

200 Suspected nerve root compression by lumbar disc herniation/foraminal stenosis **[Both]**[8]
- 210 MRI not feasible[4, 9]
- 220 Sx/findings **[One]**
  - 221 Unilateral radiculopathy with motor deficit **[One]**[10, 11]
    - -1 Severe weakness/mild atrophy in nerve root distribution by PE[12]
    - -2 Mild to moderate weakness in nerve root distribution by PE **[One]**
      - A) Continued Sx/findings **after** Rx **[Both]**
        - 1) NSAID **[One]**[13]
          - a) Rx ≥ 3 wks
          - b) Contraindicated/not tolerated[14]
        - 2) Activity modification ≥ 6 wks[15]
      - B) Worsening weakness/motor deficit ♦[16]
  - 222 Unilateral radiculopathy with sensory deficit **[One]**[17]
    - -1 Refractory severe pain in nerve root distribution **[All]**[18]
      - A) Pain unrelieved by change in body position
      - B) Interferes with ADLs[19]
      - C) Continued severe pain **after** Rx **[Both]**[20]
        - 1) NSAID **[One]**[13]
          - a) Rx ≥ 3 days

b) Contraindicated/not tolerated[14]

2) Opiate **[One]**[21]

a) Rx ≥ 3 days

b) Contraindicated/not tolerated

-2 Mild to moderate pain/paresthesias/numbness in nerve root distribution **[One]**

A) Continued Sx/finding **after** Rx **[Both]**[22]

1) NSAID **[One]**[13]

a) Rx ≥ 3 wks

b) Contraindicated/not tolerated[14]

2) Activity modification ≥ 6 wks[15]

B) Worsening Sx/findings ♦[23]

300 Suspected lumbar spinal stenosis **[All]**[24*RIN, 25]

310 MRI not feasible[4, 26, 27]

320 Low back/bilateral lower extremity Sx/findings **[All]**[28, 29]

321 Pain/paresthesias/numbness worse with walking

322 Pain/paresthesias/numbness worse with spinal extension

323 Pain/paresthesias/numbness improved with forward flexion

330 Symptoms interfere with ADLs[19]

340 Continued Sx/findings **after** Rx **[Both]**[30]

341 NSAID **[One]**[13]

-1 Rx ≥ 3 wks

-2 Contraindicated/not tolerated[14]

342 Activity modification ≥ 6 wks[31]

400 Suspected cauda equina syndrome **[Both]** ♦[26]

410 MRI not feasible[4, 32]

420 Sx/findings **[One]**

421 Bilateral lower extremity weakness/numbness/pain[12, 33]

422 Bowel incontinence and other etiologies excluded

423 Bladder dysfunction and other urologic etiologies excluded[34]

424 Diminished rectal sphincter tone by PE

425 Perianal/perineal "saddle" anesthesia by PE

500 Preoperative evaluation of osteomyelitis[35, 36]

600 Suspected bone metastasis **[All]**[37]

610 MRI not feasible[38]

620 Cancer by Hx

630 No neurologic Sx/findings[39*RIN]

640 Lumbar spine Sx/findings **[One]**

641 Pain by Hx
642 Bone lesion by bone scan/x-ray
650 Bone scan **[One]**[40]
651 Negative/nondiagnostic for bone metastasis[41]
652 Positive site in lumbar spine

700 Follow-up bone metastasis after Rx **[All]**
710 No neurologic Sx/findings(39*RIN)
720 Initial lumbar spine CT positive
730 Chemotherapy/radiation Rx completed[42]

Notes

(1)
CT is of limited value in diagnosing spinal cord compression; MYL-CT is preferred for such cases when MRI is not feasible (Winters et al., Med Clin North Am 2006; 90(3): 505-523).

(2)
The choice of imaging studies for patients who have sustained trauma depends upon the presence or absence of neurologic symptoms. If the patient does not have a neurologic deficit on PE, plain films can be obtained.

(3)
If neurologic abnormalities are identified by PE, MRI is indicated to exclude cord compression by a hematoma, bone, or disc fragments (Takhtani and Melhem, Clin Sports Med 2002; 21(1): 49-75, vi).

(4)
MRI is not feasible if it is not readily available or if the patient cannot tolerate the MRI study.

(5)
Suspicious unstable fractures on plain films should be further evaluated by CT.

(6)
Patients with a history of trauma usually undergo x-ray. However, due to the complex bony anatomy of the spine, CT is indicated if the x-ray findings are ambiguous for fracture.

(7)
Burst fractures of the thoracolumbar spine can be misdiagnosed as stable wedge compression fractures by x-ray (Bagley, Radiol Clin North Am 2006; 44(1): 1-12, vii).

(8)
Compression usually affects the sensory neurons of the nerve root first, causing pain and paresthesias. Motor neurons are somewhat less vulnerable, and are usually affected later or in more severe compression. Neurologic findings of sensory loss and reflex loss are corroborative findings for compressive radiculopathy but are not substitutes for radicular pain or muscle weakness.

(9)
MRI is the initial study of choice for suspected nerve root compression, whether caused by disc disease, tumor, or metastatic disease. CT or MYL-CT may be needed if MRI is not feasible.

(10)-DEF:
Lumbar radiculopathy refers to a sensory or motor dysfunction in the discrete distribution of an affected lumbar nerve root. Most cases result from compression of the nerve root as it exits the spinal canal, usually by a disc herniation. Radiculopathy is also frequently caused by stenosis of the lateral recess, a space bounded by the vertebral processes through which the nerve root must pass.

(11)
Weakness in radiculopathy affects muscles innervated in a specific nerve root distribution:
- Quadriceps weakness (L3)
- Quadriceps or anterior tibialis weakness (L4)
- Foot or toe dorsiflexor weakness (L5)
- Foot, toe plantar flexor, or hamstring weakness (S1)

Anatomic variation can exist in these nerve root distributions. Early on in the disease process the entire nerve root distribution may not be affected.

(12)
Muscle strength can be graded on a 0 to 5 scale (0 is no visible or palpable muscle contraction and 5 is normal strength) (Braddom and Buschbacher, Physical medicine and rehabilitation, 2nd ed. 2000). For the purposes of these criteria, severe muscle weakness is defined as "less than 2 out of 5" muscle strength by PE (less than full ROM with gravity eliminated) or the inability to ambulate.

(13)-POL:
NSAIDs are preferred for the treatment of this condition because of their anti-inflammatory effect. It is a matter of local medical policy whether to accept acetaminophen or other analgesics as alternatives for NSAIDs.

(14)
Contraindications to NSAIDs may be absolute (e.g., pregnancy, history of allergic reaction) or relative (e.g., anticoagulant use, history of PUD).

(15)
Activity modification for lumbar radiculopathy involves limiting activities that provoke or aggravate symptoms, such as heavy lifting, repetitive bending, or prolonged standing. PT with exercises to improve posture and strengthen the lumbar muscles may be beneficial in some patients.

(16)
Urgent imaging should be considered for patients with progressive motor weakness.

(17)
Pain in radiculopathy is present in a specific nerve root distribution:
• Hip, thigh, and knee pain (L3)
• Hip, thigh, knee, and medial leg pain (L4)
• Hip, lateral thigh, and leg pain (L5)
• Buttock, posterior thigh, and calf pain (S1)
Anatomic variation can exist in these nerve root distributions. Early on in the disease process the entire nerve root distribution may not be affected.

(18)
Early evaluation for patients with refractory pain is reasonable, including those patients with excruciating symptoms that are unremitting, totally unresponsive to treatment, and interfere significantly with ADLs. This is an unusual circumstance, as most patients are able to achieve some relief with rest and analgesics. Early evaluation is to verify the diagnosis, to exclude other causes of severe pain, and for consideration of interventions such as epidural steroid injection and surgery. Assessment should also include psychosocial issues, since nonphysical factors can complicate treatment.

(19)
Activities of daily living (ADLs) are frequently divided into those simple activities relating to basic self-care and those that involve more complex interactions with others and the environment (called instrumental activities of daily living or IADLs). This criterion includes both types of activity. Whether a condition is of sufficient severity to interfere with ADLs or IADLs is somewhat subjective. There should be an indication that symptoms impede the patient's ability to effectively work, shop, manage at home, care for family members, or tend to personal hygiene.

(20)
Muscle relaxants (e.g., cyclobenzaprine) may be effective within the first 4 days of treatment when muscle spasm is present; their benefits, however, must be weighed against their sedative properties (Chou and Huffman, Ann Intern Med 2007; 147(7): 505-514).

(21)
The short-term effectiveness of opioids has been documented for a variety of pain syndromes; prolonged use is generally not recommended because of the potential for sedation and physical dependence (Douglass and Bope, J Am Board Fam Pract 2004; 17 Suppl: S13-22).

(22)
Treatment of radiculopathy primarily involves NSAIDs and activity modification. Opiates are sometimes useful for short-term pain control, and some patients find relief using muscle relaxants as well.

(23)
Worsening symptoms includes pain that is intensifying or extending to a more distal site.

(24)-RIN:
Cauda equina syndrome is suspected in patients who present with bilateral sensory loss or significant motor deficits. For suspected cauda equina syndrome, see indication 400 within this criteria subset.

(25)-DEF:
Lumbar spinal stenosis is a syndrome of single or multiple level narrowing of the spinal canal. It is usually caused by degenerative changes involving the spine. Severe cases of lumbar spinal stenosis can result in cauda equina compression.

(26)-DEF:
The cauda equina (horse's tail) is a collection of dorsal and ventral nerve roots caudal to the termination of the spinal cord. Cauda equina syndrome is compression of these multiple nerve roots in the lumbar spinal canal, usually due to a large central herniated

disc. The primary symptoms of cauda equina syndrome include lower extremity weakness, bowel and bladder dysfunction, diminished rectal sphincter tone, or perianal or perineal "saddle" anesthesia.

(27)
MRI is the imaging procedure of choice for suspected lumbar spinal stenosis. MRI is more sensitive than CT in demonstrating disc degeneration, disc protrusion, and nerve root compression. CT or MYL-CT is reasonable when MRI is unavailable or contraindicated (Sengupta and Herkowitz, Orthop Clin North Am 2003; 34(2): 281-295; Patel, J Neurol Neurosurg Psychiatry 2002; 73 Suppl 1: i42-48).

(28)
Symptoms of pain in the buttocks, thighs, or calves with walking or after prolonged standing are known as neurogenic claudication.

(29)
Neurogenic intermittent claudication secondary to lumbar spinal stenosis is a degenerative condition generally affecting patients 50 years of age or older. Characteristic symptoms include back and leg pain, tingling, numbness, and weakness that are present depending on the patient's posture; symptoms become worse with spinal extension, such as with walking or after prolonged standing and are relieved with forward flexion.

(30)
Patients with spinal stenosis usually respond to conservative treatment; imaging is postponed until there is a need for an intervention (Watters et al., Spine J 2008; 8(2): 305-310).

(31)
Activity modification for lumbar spinal stenosis involves limiting activities that provoke or aggravate symptoms, and may include a brief period of rest. PT with exercises to improve posture and strengthen lumbar muscles, and flexion exercises (e.g., riding a stationary bike in a forward flexed position) may be beneficial in some patients (Sengupta and Herkowitz, Orthop Clin North Am 2003; 34(2): 281-295; Patel, J Neurol Neurosurg Psychiatry 2002; 73 Suppl 1: i42-48).

(32)
MRI is the preferred imaging procedure since it will better demonstrate the cause and extent of the cauda equina compression.

(33)
An isolated sensory deficit as the sole manifestation of cauda equina compression is rare. If an isolated sensory deficit is present, peripheral neuropathy (e.g., diabetic neuropathy) is more likely. The pattern of sensory loss in cauda equina compression is often diffuse (with overlapping nerve root distributions) and asymmetric or unilateral.

(34)
Urinary retention is a common symptom of cauda equina syndrome. Other urinary symptoms may include frequency, hesitancy, urgency, or incontinence.

(35)
Although relatively uncommon, vertebral osteomyelitis can occur in patients with recent spine surgery, or in those with DM, immunosuppression, IV drug use, or alcohol dependence. Early diagnosis and treatment can prevent serious complications that may include vertebral instability or collapse, or the development of an epidural abscess (Patel, J Neurol Neurosurg Psychiatry 2002; 73 Suppl 1: i42-48; Tay et al., J Am Acad Orthop Surg 2002; 10(3): 188-197).

(36)
CT and MRI can both be used to image osteomyelitis. CT is used to reveal the location and amount of bone destruction, but it is less sensitive for detecting early marrow changes not associated with cortical bone abnormalities (Tay et al., J Am Acad Orthop Surg 2002; 10(3): 188-197). MRI is superior for assessment of bone marrow involvement, vertebral end plate destruction, and the spread of infection into the spinal canal, nerve roots, and soft tissue (Nikkanen et al., J Emerg Med 2002; 22(3): 279-283; Stabler and Reiser, Radiol Clin North Am 2001; 39(1): 115-135).

(37)
Metastases from primary breast, lung, and prostate cancer are the most common neoplasms of the spine (Ratliff and Cooper, South Med J 2004; 97(3): 246-253).

(38)
MRI has proven advantages over all other imaging modalities for suspected bone metastasis; it can characterize the lesion and adjacent marrow (El-Khoury et al. Expert Panel on Musculoskeletal Imaging. Metastatic bone disease. 2005; Ratliff and Cooper, South Med J 2004; 97(3): 246-253). When MRI is not feasible, that is, it is not readily available or the patient cannot tolerate the MRI study, CT may be performed.

(39)-RIN:

For neurologic symptoms or findings, see indication 200, 300, or 400 within this criteria subset or the "Magnetic Resonance Imaging (MRI), Lumbar Spine" criteria subset.

(40)

In patients with known cancer and bone pain, a bone scan is appropriate for initial staging.

(41)

Although a bone scan is positive in the vast majority of patients with spinal metastasis, it can be negative or nondiagnostic in some tumors, such as myeloma, lymphoma, and anaplastic tumors.

(42)

The assessment is generally performed about 6 weeks after radiation is completed or after the chemotherapy is completed.