

2011 Imaging Criteria

Magnetic Resonance Imaging (MRI), Lumbar Spine (Pediatric)^(1, 2)

ICD-9-CM: 88.93

CPT: 72148, 72149, 72158

I/O Setting: Outpatient

INDICATION(S)

- 100 Low back pain
- 200 Suspected nerve root compression by lumbar disc herniation
- 300 Suspected nerve root compression by tumor/metastasis (gadolinium contrast recommended) ♦
- 400 Suspected osteomyelitis/disc space infection (gadolinium contrast recommended)
- 500 Suspected lumbar spine injury with neurologic deficit at/distal to injury ♦
- 600 Suspected congenital lumbar spine defect **and** x-ray positive/nondiagnostic

- 100 Low back pain **[All]**⁽³⁾
 - 110 No neurologic Sx/findings^{(4)*RIN}
 - 120 X-ray nondiagnostic for etiology of pain⁽⁵⁾
 - 130 Continued pain **after** Rx **[Both]**
 - 131 NSAID **[One]**⁽⁶⁾
 - 1 Rx ≥ 3 wks
 - 2 Contraindicated/not tolerated⁽⁷⁾
 - 132 Activity modification ≥ 4 wks⁽⁸⁾
- 200 Suspected nerve root compression by lumbar disc herniation **[Both]**⁽⁹⁾
 - 210 Neurologic deficit/positive straight leg raise⁽¹⁰⁾
 - 220 Sx/findings **[One]**
 - 221 Motor deficit in a nerve root distribution^(11, 12)
 - 222 Sensory deficit in a nerve root distribution^(13, 14)
- 300 Suspected nerve root compression by tumor/metastasis (gadolinium contrast recommended) **[Both]**⁽¹⁵⁾ ♦
 - 310 Lumbar spine Sx/findings **[One]**⁽¹⁶⁾
 - 311 Cancer by Hx
 - 312 Pain worse at night by Hx
 - 313 Palpable mass
 - 314 Unexplained weight loss
 - 315 Bone lesion by bone scan/x-ray
 - 320 Unilateral pain/weakness in a nerve root distribution⁽¹⁷⁾

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- 400 Suspected osteomyelitis/disc space infection (gadolinium contrast recommended) **[Both]**^(15, 18)
- 410 Localized lumbar spine pain by Hx
- 420 Findings **[One]**^(19, 20)
- 421 ESR > normal
 - 422 Temperature > 100.4 F(38.0 C)
 - 423 WBC > 10,000/cu.mm($10 \times 10^9/L$)
 - 424 Blood culture positive
 - 425 C-reactive protein > normal
- 500 Suspected lumbar spine injury with neurologic deficit at/distal to injury **♦**⁽²¹⁾
- 600 Suspected congenital lumbar spine defect **and** x-ray positive/nondiagnostic⁽²²⁾

Notes

(1)

The threshold for ordering a lumbar MRI in the pediatric population is much lower than the adult population due to the fact that children have a greater likelihood of serious underlying pathology.

(2)

The following are examples of relative and absolute contraindications to the use of magnetic resonance imaging:

- Implanted devices that are electrically or magnetically activated (e.g., cardiac pacemakers, automatic cardioverter defibrillators, drug infusion pumps, cochlear implants)
- Ferromagnetic metal objects (e.g., cerebral aneurysm clips, intraocular metallic foreign body, prostheses, screws)
- Pregnancy, first trimester
- Renal insufficiency in cases when magnetic resonance imaging is performed with gadolinium-based contrast

(3)

There are an increasing number of children and adolescents, especially athletes, presenting with low back pain due to sports injuries (Kerssemakers et al., *Pediatr Radiol* 2009; 39(5): 471-484). Back pain in the pediatric population is more worrisome than low back pain in adults because there is usually an identifiable cause, unlike musculoskeletal strain in adults (Bernstein and Cozen, *Am Fam Physician* 2007; 76(11): 1669-1676). Children and adolescents with back pain, without significant physical findings, and no neurologic deficit can be treated conservatively. MRI plays a key role in imaging patients who fail to respond to conservative therapy.

(4)-RIN:

For neurologic symptoms or findings, see indication 200 in this criteria subset.

(5)

X-ray is performed to exclude spondylolysis, a stress fracture of the pars interarticularis which is a common cause of back pain in athletes. MRI is appropriate for patients with normal or nondiagnostic plain films who fail to improve with conservative treatment.

(6)-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.

(7)

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

(8)

Activity modification for children and adolescents with low back pain involves limiting activities that provoke or aggravate symptoms, such as engaging in sporting activities.

(9)

Disc herniation is rare in children and teens and differs from the condition in adults primarily because symptoms are intermittent and without dramatic neurologic findings. The diagnosis is frequently delayed because back pain is often not accompanied by radiculopathy or neurologic signs. The back pain may become constant and disabling with sciatica developing later. Except for positive straight leg raises, there may be essentially no neurologic findings. The lack of neurologic findings is attributed to the increased canal size and flexibility of the adolescent spine, which allow the dura to move away and accommodate intruding disc.

(10)

Most children and adolescents in whom a lumbar herniated disc is suspected will present with positive straight leg raises. Radiculopathy is not common; however, any neurologic deficit or sign of nerve root compression warrants prompt MRI evaluation.

(11)

Muscle weakness is rare in children and adolescents with a lumbar disc herniation.

(12)

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.

(13)

Lumbar disc herniation in children and adolescents may present with pain radiating down one or both legs or pain with the Valsalva maneuver. Paresthesias or numbness can occur but are less likely in the pediatric population.

(14)

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.

(15)

Gadolinium-enhanced MRI (GdMRI) is the preferred imaging method for evaluating patients with suspected or confirmed primary tumor or metastatic intraspinal extension, suspected or confirmed disc space infection, or an epidural abscess (Chin, *Semin Neurol* 2002; 22(2): 205-220; Runge et al., *Top Magn Reson Imaging* 2001; 12(4): 231-263). Contrast improves lesion delineation, localizes regions likely to provide positive biopsy, and identifies active disease (Jacobs et al., *NeuroRx* 2005; 2(2): 333-347).

(16)

Back pain is the most common presenting complaint in children who have a tumor involving the vertebral column or the spinal cord.

(17)

The weakness with nerve root compression 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)

The pain with nerve root compression 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 the entire nerve root distribution may not be affected.

(18)

Discitis is generally seen in children younger than 5 years of age, while vertebral osteomyelitis occurs in older children and adolescents. *S. aureus* is the most common organism identified.

(19)

If the patient is immunocompromised, fever may not be present and the WBC may be unchanged or low.

(20)

Although x-rays are commonly performed for suspected osteomyelitis or discitis and may be highly suggestive, MRI remains the definitive test to determine the extent of disease. In addition, vertebral osteomyelitis may not be found on initial x-ray, as infection is often present 2 to 3 weeks before radiologic changes are evident (Nikkanen et al., *J Emerg Med* 2002; 22(3): 279-283).

(21)

MRI is the preferred test for imaging cord injuries, with its ability to differentiate cord contusion from cord compression (Daffner and Hackney, *J Am Coll Radiol* 2007; 4(11): 762-775). Cord injuries include cases with fracture and those without fracture (SCIWORA - spinal cord injury without radiologic abnormality). Often both CT and MRI are performed in this setting.

(22)

There are dozens of congenital abnormalities of the spine that may be present at birth or develop during childhood or adolescence. X-rays of the spine are recommended as part of the initial evaluation for patients with clinical findings suggestive of a spinal deformity. Positive x-ray findings (e.g., spina bifida, hemivertebrae, scoliosis) may require further imaging with MRI to evaluate the surrounding structures and spinal cord. MRI is also helpful in imaging structures not easily seen on plain films (e.g., syringomyelia, tethered cord)

(Suh et al., J Pediatr Orthop 2001; 21(4): 525-531).